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PATENTS FOR INVENTIONS.

ABRIDGMENTS

OF THE

Specifications

RELATING TO

SHIP BUILDING, REPAIRING, SHEATHING, LAUNCHING, &c.

PART II.—A.D. 1861-1866.

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1869.

PREFACE.

The Indexes to Patents are now so numerous and costly as to render their purchase inconvenient to a large number of inventors and others, to whom they have become indispensable.

To obviate this difficulty, short abstracts or abridgments of the Specifications of Patents under each head of Invention have been prepared for publication separately, and so arranged as to form at once a Chronological, Alphabetical, Subject-matter, and Reference Index to the class to which they relate. As these publications do not supersede the necessity for consulting the Specifications, the prices at which the printed copies of the latter are sold have been added.

The number of Specifications from the earliest period to the end of the year 1866 amounts to 59,222. A large proportion of the Specifications enrolled under the old law, previous to 1852, embrace several distinct Inventions, and many of those filed under the new law of 1852 indicate various applications of the single Invention to which the Patent is limited. Considering, therefore, the large number of Inventions and applications of Inventions to be separately dealt with, it cannot be doubted that several properly belonging to the group which forms the subject of this volume have been overlooked. In the progress of the whole work such omissions will, from time to time, become apparent, and be supplied in second or supplemental editions.

This second series of Abridgments, like the first, relates to Shipbuilding, Repairing, Sheathing, and Launching, and also includes painting, lighting, ventilating, and extinguishing fires (excepting improvements in fire-engines and pumps, which will be found in the series of Abridgments relating to Hydraulics), and also the means of preventing shipwreck and other casualties. Abridgments relating to steering are only inserted where there is an improvement in the rudder or ordinary apparatus. Armour, and the modes of attaching and fastening it are included; but not the modes of manufacturing such armour. Inventions relating to anchors, cables, masts, sails, rigging, and navigating vessels are reserved for distinct publication, although some of these subjects form part of the Inventions included in this volume and are referred to in the Subject-matter Index.

The Abridgments marked thus (* *) in the following pages were prepared for another series or class, and have been transferred therefrom to this volume.

B. WOODCROFT.

May, 1869.

INDEX OF NAMES.

[The names printed in *Italic* are those of the persons by whom the inventions have been communicated to the Patentees.]

INTRODUCTION.

The former volume of Abridgments of Specifications relating to Shipbuilding extended over a period of nearly two centuries and a half. The size of the present volume, embracing only six years, shows the extraordinary amount of public interest which the art of shipbuilding has excited during this period. Much of this excitement has been the result of the experience gained in the Russian war, 1853-55, of the effects of incendiary projectiles upon lofty wooden ships, and much also from the more recent civil war in the United States of America. The energy and enterprise of the Imperial government in France gave to that country the start in the construction of a navy adapted to the conditions of modern warfare, and the production of the first ironclad seagoing ship, after a previous success with the first *screw* line of battle ship, gave to France an éclat in naval matters which excited the envy of the English marine.

The spur thus given to English pride created an impulse which produced the Warrior, the Northumberland, the Royal Sovereign, the Bellerophon, the Hercules, and other sea monsters, and is still powerfully operative. Some of these, clothed in heavy mail, throwing shot and shells weighing four or five hundredweight each, are capable of driving an iron spur, or rather, they actually form in themselves vast spurs weighing 8,000 or 9,000 tons each, which may strike an adversary with a speed of 16 or more statute miles an hour. France was compelled, or at least chose, to employ as the material for her new navy that which had been so well tried, viz., the oaks of her own and of Italian forests. English architects seeing that the engines and armour for one of these monsters would cost at least 100,000*l.* and weigh 2,000 tons, resolved to discard as soon as possible the weak and perishable material, and give to them all the strength and durability of iron and steel. This course has commended itself to the world, and Russians, Italians, Prussians, Dutch, Greeks, Brazilians, Chilians, and Turks have resorted during the last five or six years to the ship yards of the Thames, Tyne, Mersey, and Clyde for their costly

engines of maritime war. The former volume showed the commencement of these activities, in patents for turrets, iron-cased ships, and steam rams, and a very large proportion of the patents in this volume relate to the same subjects. But since the date of the last volume the armour plating employed has been trebled in thickness, and the manufacture has reached such perfection that plates are rolled in Sheffield of exactly defined temper (tested by shot), of 15 inches in thickness, and weighing as much as twenty tons each. Sheffield now has the manufacture of these plates for almost every maritime country in the world in its own hands. During the same period naval guns have increased in weight to six times, and projectiles to eight or nine times the heaviest then known, and for these also Sheffield and Newcastle manufactures are in demand all over the world.

In the merchant marine also there has been much activity, but the patents relating to it have had reference mainly to prevention of fouling, a subject which has been very fruitful of invention, but in which there still appears great room for improvement.

SHIP BUILDING, REPAIRING, SHEATHING, LAUNCHING, &c.

SHIP BUILDING, REPAIRING, SHEATHING, AND LAUNCHING.

1861.

A.D. 1861, January 2.—N° 6.

COOKE, WILLIAM.—"Improvements in apparatus for venti-"lating." "I provide apparatus made of glass or other suitable "material, which material may be perforated or not, of such "widths and lengths as may be desired, and fitted to a window "or other opening, the same working on axles or centres secured "to the extreme ends of the apparatus, which axles or centres "work in sockets or plates fastened to the reveal or opening. "The same principle can also be adopted in the walls of all "descriptions of buildings or other enclosed spaces, an opening "being formed in the wall where an apparatus similar in con-"struction and movement as herebefore mentioned, is secured in "the opening either in a frame or not, as may be desired, such "frame being made of iron, wood, or other suitable material. The "above apparatus may be attached or not to the frame of the "window or sliding door, or shutter of the opening in which the "apparatus is fixed, or it may be worked by means of a cord, and "when so constructed as to move with the window sash, sliding "door, or shutter above-mentioned, the admission and emission "of the air is regulated by the movement of the window sash, "sliding shutter, or cord. I attach to the soffit of the inner or "outer opening a piece of zinc or other suitable material, perfo-"rated or not.

"Another method I propose to adopt is by means of an appa-"ratus of glass or other suitable material, secured or not to the "sash of a window, or to a sliding shutter or door of any other "opening, and working on centres in grooves secured to the "reveal of any such herebefore-mentioned openings; such venti-

" lator may be fastened, if desired, to the soffit of the window or
" opening, and may be constructed of one or more folds or slides
" which are made to work one within the other.

"Another method is by means of an apparatus of glass or other
" material, perforated or not, which may be attached to the frame
" of a window, door, or other opening, and can be drawn into
" action by a cord or other suitable arrangement."

Such an apparatus may be secured to the soffit of the window opening, having upon the opposite side a bolt, and on the top sash a small hole wherein may be secured a suitable spring to retain the ventilator in its place when required in use; at the back of the apparatus one or more springs are to be applied, which effectually retain the ventilator, and withdraw it when not required into its place; the sash may be opened without the ventilator leaving the soffit of the window opening.

" The whole of these improved ventilators may be used in other
" positions, and in all kinds of buildings and enclosed spaces, and
" the same principle adopted, although its form and application
" may differ."

Another portion of the invention has for its object certain peculiar improvements in ventilating or smoke-dispersing wind guards for the purpose of effectually obtaining an up draught.

In carrying out the above object "I construct an apparatus
" having several funnels or rims, which are placed one above the
" other at certain angles and heights, such funnels being made
" of iron, zinc, earthenware, or other suitable material, and being
" so constructed as to increase the opening, space, or diameter of
" the inside measurement as the apparatus increases in height,
" whilst the outside circumference remains the same size
" throughout.

"Another method consists of an apparatus having several
" cylinders, funnels, tubes, or shafts fixed at certain elevations
" within and attached to an outer casing or tube, which tube or
" casing may be made with certain openings at the side, such
" inner cylinders, funnels, tubes, or shafts being made to increase
" in diameter or not, as may be desired, and having attached to
" them certain casings or divisions for the purpose of preventing
" a downward current over the apertures of the above apparatus,
" which may be constructed of iron, zinc, earthenware, or other
" suitable material. I attach in some cases a moveable guard of

" a cone-like or other suitable shape for the purpose of preventing " a downward draught."

[Printed, 1s. 4d. Drawings.]

A.D. 1861, January 9.—N° 53.

TAYLOR, William.—" A combined heating and ventilating " pipe to be made elliptically or otherwise." The invention consists of " a pipe made in any shape or form, and of any length " or size, and of any kind of material that is suitable, such as " cast, malleable, or sheet iron, copper, tin, zinc, or anything that " will contain heated water, steam, or gas, &c., and having in it " at least two compartments so as to contain one part hot water, " steam, gas, or any other heating medium, and the other is an " air chamber or compartment. To accomplish this I cast a " partition or division in a cast-iron pipe, or I form an air cham- " ber on the outside instead of the inside of the pipe," the ends of the part of the pipe containing the heating medium are left open so as to keep up a continual flow and return, but the ends of the air chamber are completely closed. The air chamber can be made or divided into as many compartments as is required. Each air chamber has an inlet to admit the fresh air, and an outlet to convey or distribute it where required. The pipes can be made to be put together in the common way of jointing, or with flexible joints, so as to be moved about in mines, ships' holds, or any place requiring it, having wheels to move on if required. All the bends, connexions, and requisite parts are made suitable for the different forms of pipes, the air or ventilating chamber or chambers, if not cast on the pipe, can be made in any form, and fastened to the pipe afterwards, or one pipe can be put into the other, or made in any way, so long as there is an air chamber heated by the heating medium in connexion with it.

Another form of pipe on this plan has three chambers or compartments, the middle one of which is stopped at the ends so as to form an air chamber, as before described, which is heated by the heating medium on each side, and being divided by this air chamber, is made to form a flow and return pipe in itself, so that it needs but one pipe to both heat and ventilate a room. " I take " a piece of copper, sheet iron, zinc, tin, or any suitable material " and bend it over a mandril the required form or shape, I then " bend another piece suitable for the inside or air chamber, which " I put into the other and rivet the whole together."

The action of the apparatus is as follows :—"I form a connexion "from any place the air is required to be taken from with the hot "air chamber near the end, this can be done by common iron "pipes jointed together, or by constructing a flue with bricks, or "of common pipes or any suitable way": "near the other end of "of the air chamber I have an outlet" which by means of branch pipes is used to convey the heated fresh air where required. Taps can be used for the purpose of regulating the quantity or turning it from one branch pipe to another, and so as to both regulate the temperature and cause a free circulation of pure air at the same time. The fresh air rushes in to supply the partial vacuum caused by the escape of the heated air through the outlet, as described, into the place to be warmed.

[Printed, 6*d*. Drawing.]

A.D. 1861, January 16.—N° 128. (**)

TELFER, JOHN.—(*Provisional protection only.*)—"Improve- "ments in capstans and winches for hoisting, which improve- "ments are also applicable to the steering of ships."

These improvements are thus defined :—

"This invention relates to the manufacture of certain ma- "chinery or apparatus for raising or hoisting heavy goods to any "required height without the necessity of moving the hoisting "apparatus from one spot to another, and is effected as follows :— "I propose employing a barrel or cylinder, and placing it in a "horizontal position instead of vertically as heretofore, and at- "taching it to a revolving pillar, so as to swing it round to any "required angle. I also propose placing a toothed wheel inside "it at that end of the barrel or cylinder nearest the pillar, into "which wheel gears a smaller spur wheel for quick motion; but "where much power is required a toothed pinion may be placed "near the spur wheel, and made to work in or out of gear as "more or less power is required, both wheels being actuated by "a loose winch handle. When required to alter the position of "the barrel or cylinder, it can be swung round with the pillar "on a turn-table, said table being provided with slots or nicks "cut at intervals, into which falls a hinged lug to keep it in the "position required."

"This description of apparatus is alike applicable to the steer- "ing of ships, in which case the the pillar and cylinder are to be "detached from the table and secured to the ship's deck, the

" tiller ropes or chains being made fast on to the barrel or " cylinder."

[Printed, 4d. No Drawings.]

A.D. 1861, January 22.—N° 172.

ELLIS, EDWARD.—" Improved machinery or apparatus for " picking and cleaning 'oakum,' and for spinning or twisting the " same for the purpose of calking ships or vessels."

The invention consists in an arrangement of mechanism, " wherein a cylinder or drum having a series of pointed projec- " tions, or pegs or pins arranged around its periphery, rotates " within a circular or semicircular casing, also having its in- " terior surface furnished with pointed pegs or pins placed in " alternate positions in such a manner that the series of pegs " on the cylinder as it rotates may pass those on the interior of " the casing. The 'oakum' to be cleaned is fed on to the cylinder " by an endless cloth, and after having been subjected to the " tearing, opening, or separating action of the pegs for a time, it " passes out at the lower part of the machine, either to a second " machine of a similar kind or to the apparatus in connection " therewith," " for spinning or twisting the 'oakum' thus " cleaned."

This apparatus " consists in an outer cylinder or chamber, and " an inner cylinder or drum, both being mounted upon a central " shaft, and of such dimensions as to leave an annular space " between them; the surfaces of the cylinder and its internal " drum intended to twist the 'oakum' being furnished with a " spiral rib or band of india-rubber. By means of spur gearing " these cylinders are caused to rotate in opposite directions, so " that when the 'oakum' is introduced from the cleaning ma- " chine into the annular space between the cylinders the combined " effect of the spiral bands of india-rubber, and the contrary " direction of the cylinders, produces a rubbing and twisting " action upon the 'oakum,' causing it to issue from the lower " end of the machine in a twisted state or soft 'sliver' or " 'roving.'"

[Printed, 10d. Drawing.]

A.D. 1861, January 25.—N° 206.

LUNGLEY, CHARLES.—" Improvements in the construction of " ships and other vessels for war purposes." " The invention

" consists, firstly, in covering either the whole or a portion only " of the length of a ship or other vessel (which may be built " either of wood or of iron) with thick iron plates, or other shot- " proof materials, from a few feet below the water's surface up to " the level of or a foot or two above the water line, and in placing " at about the same height a shot-proof deck. By these means " the entrance of shot or shell into the protected portion of the " vessel beneath the water will be prevented; and if this portion " is made (as I intend it to be) of sufficient volume to support " the whole vessel when fully equipped, it will be impossible for " shot or shell to sink her."

Secondly, " in coating any required portion or portions of the " upper part of a ship or other vessel constructed as just de- " scribed with thick iron plates, or other shot-proof materials, in " order to form a shot-proof battery or batteries, and in connect- " ing this battery with the lower parts of the vessel by means of " plated or other shot-proof trunks, through which communica- " tion may be had with the interior of the vessel below the water " for general purposes, and through which also supplies of am- " munition may be securely passed up to the battery or batteries " from the magazine. The framing of the ship by which the " protected upper portions of the vessel (that is, the batteries,) are " supported is, by preference, to be stout enough to resist shot."

Thirdly, "in forming the thick iron plates with portions rolled " comparatively thin, so that part of the fastenings thereof may " be passed through such thin parts only, thus incorporating the " plates more efficiently than heretofore with the hull, and at the " same time keeping the heads of the principal bolts unexposed. " Other bolts may be passed through the thicker portions of the " plates where desired."

[Printed, 1*s*. Drawings.]

A.D. 1861, January 26.—N° 214.

ARROWSMITH, John.—" Improvements in the manufacture " of armour plates for gun boats and land batteries, and in " machinery and furnaces used in the said manufacture."

In making armour plates according to this invention, " I make " the said plates from piled bars, each of which is formed of three " bars rolled to the forms and fitting into each other as described" in the Specification of the Patent bearing date December 8, 1859,

No 2781 (No 2780 is probably intended), "excepting that in some "of the piled bars I make one of the said bars broader on one of "its sides than the other bars of which the piled bar is composed, "so that when one of these piled bars is introduced into an "armour plate a rib is formed on the plate for the purpose of "attaching the said plates to the gun boats or batteries instead "of attaching the said plates by drilling holes in them; or the "said piled bars having ribs or projections may be made up of a "number of small bars." "When I wish to make two or more "ribs on the plate I take two or more of the piled bars having "the ribs or projections, and a sufficient number without the "projections to make up the necessary width. The bars having "the projections may be placed either at the outside or in any "intermediate position of the plate as required. The pile com-"posed of piled bars of the kinds described is then heated in my "improved furnace," and being raised to a welding heat is passed through the rolling machinery, and the parts composing the said pile are thereby welded together, and rolled into an armour plate; "or the bars made as before explained may be used as armour "plates by simply locking or engaging them together instead of "welding them together."

The armour plates are secured to the sides of the battery by screwed rods or pins and nuts. The interior of the floating battery has other plates fixed thereto, against which the nuts on the ends of the rods or pins bear, and thereby bind the parts of the battery together. An india-rubber washer is interposed between each of the nuts and the surface of the plates.

For attaching the ends of these bolts to the armour plates "I "cut att he required intervals in therib" "a wedge-shaped recess, "into which I fix a wedge-shaped nut." This nut is tapped before being fixed in the rib, and into the said tapped nut the end of the bolt is screwed. "Instead of fixing the bolts or rods to the "ribs by screwing, they may be fixed to the ribs on the plates by "making on the ends of the said bolts or rods dovetail pieces "which fit into dovetail recesses made in the ribs." In order to prevent wet from acting on and injuring the screwed rods or pins and nuts, each of the said rods and pins is passed through a metal tube inserted in the sides of the battery.

The inventor also claims improvements in rolling machinery "for welding and rolling piles into bars for armour plates, and "welding and rolling the said bars into armour plates," also

in furnaces for heating piles to be welded and rolled into bars and armour plates.

[Printed, 3s. 4d. Drawings.]

A.D. 1861, January 30.—N° 247.

POOLE, JOHN and WRIGHT, JAMES.—"Improvements in "steering or guiding steam or other vessels, and also in working "or actuating their rudders." The invention consists "in im- "provements in steering or guiding steam or other vessels, and "also in working or actuating their rudders, to be as follows, "that is to say:—Transversely to the direction of the ship's "length in any part of the vessel most suitable, preferably the "stern, we place a cylinder, or box, or channel, open either at top "or bottom. Within this box, and rotating upon an axis, is a "cylinder or drum, within which, on grooves or slots, work one "or more vanes or blades; these blades are actuated in such a "manner either by means of grooved channels, or by springs, as "to move eccentrically to the said drum, thereby exposing alter- "nately a portion of their surface to the water during their "revolutions, which is caused by the action of an endless chain "or band passing over a pulley or wheel fixed on the spindle of "the ordinary steering wheel, or over the shaft of the screw or "paddle, or on that of an auxiliary engine in steam vessels."

Also to certain apparatus for actuating the rudders of vessels. This consists of "the application of an endless chain or chains, "rope, strap, or gearing passing over a flat or grooved pulley, "rigger, or drum on the paddle or screw shaft, and also over "another one, on a shaft suitably placed above or beneath the "deck; on which shaft is placed loose cones, carrying chains on "their peripheries, and which are connected by means of an "intermediate shaft or other apparatus with the ropes of the "tiller which actuates the rudder in the ordinary way. The "shaft and cones may be placed in a vertical or horizontal posi- "tion with suitable guide wheels or pullies to cause the endless "chains to diverge from the vertical to the horizontal line or "course; when the wheel or pulley which is driven by the endless "chain is placed horizontally the cones may be dispensed with "by causing the chains from the tiller to be pressed down on its "flat sides, which may be serrated or grooved in order to promote "adhesion.

"We also propose to apply the motion or mechanical arrange-" ment known as the dumb scissors to be worked by a steam " cylinder and piston connected with the boiler, and placed in " any convenient position on deck or elsewhere and attached to " the tiller chains.

"We also further propose to apply one or more spiral grooved " cones with their bases reversed to each other with a chain or " chains passing over them, thereby causing in the course of their " revolutions a continual change of leverage or difference in " diameter similar to a horological fusee. The one cone will be " placed on the shaft or axle of the ordinary steering wheel, the " other on a shaft above or below and parallel to it, around which " will pass the tiller chain as ordinarily used."

[Printed, 10*d*. Drawings.]

A.D. 1861, February 1.—N° 269.

CRICHTON, ALEXANDER.—" Improvements in applying and " fitting screw propellers, and in forming and fitting the stern " parts of ships for receiving screws."

According to this invention, instead of providing a trunk of a size necessary to admit of raising the screw and frame vertically out of the water, the last (or outer) length of shaft is connected with the length adjacent to it by a joint or coupling in the manner of a hinge, so that when the knuckles or faces of the joints stand vertically, this piece of shaft, having the screw upon it, may be raised from the horizontal to a vertical position. "The water-" tight gland or stuffing box upon the screw shaft is in advance " of or forward of the joint or coupling, as is also the thrust block. " Suitable bearings are provided for the moveable length of screw " shaft to rest in when at work, and top brasses or bearings may " be provided and be placed in position when the shaft is lowered, " and capable of being moved or withdrawn horizontally or verti-" cally when the screw and its shaft have to be raised or withdrawn. " The last length or piece of propeller shaft need only be of a " length sufficient to enable the point of the lower blade of the " screw to come within the line of the inner stern post when the " screw shaft is vertical and the screw horizontal; but the screw " shaft may be turned up to an extent less or more than ninety " degrees from its original plane of rotation, for the purpose of " accommodating any feature in the internal arrangement of the

" stern of the ship. For the purpose of enabling the screw shaft " to be raised as described, as also for the purpose of allowing the " screw propeller to be raised and moved inward by describing a " quadrant or any lesser or greater portion of a circle, I divide " the inner stern post from the boss upwards into two parts or " thicknesses, leaving the requisite space between them, and I " form a box or hollow space immediately above the narrower " part of such opening for the purpose of receiving the screw." This water-tight or boxed space may be continued up to any convenient height above the deep load water line.

For the purpose of closing the opening left by the screw propeller when withdrawn, a sliding shutter piece is provided of such dimensions and form as will enclose the opening or space between the outer and inner stern posts. This sliding shutter piece may be raised or lowered by means of a winch or barrel worked from above.

[Printed, 8*d*. Drawing.]

A.D. 1861, February 4.—N° 289.

ABRAHAM, JOHN.—" An improvement or improvements in brass " nails to be used in sheathing ships, and for other like purposes."

The invention consists in making brass nails to be used in sheathing ships and for other like purposes, " with four or a " greater number of concave or hollow fluted sides," instead of with plain or flat sides.

[Printed, 6*d*. Drawing.]

A.D. 1861, February 6.—N° 310.

ROBERTSON, ANDREW JOHN.—(*Provisional protection only.*) —" Improvements in the construction of ships and vessels." In order to decrease as much as possible the resistance offered to ships and vessels " by the water in passing through it, I make the load " water line concave, both at the bow and stern ; and beyond " these concave portions, in passing into the body or centre portion " of the vessel, the line becomes convex ; and in combination with " this formation of the load water line of a ship or vessel, the " vertical lines throughout both the bow and the stern of the ship " in passing from the load water line on one side to the same " level on the other side, are semicircular, that is to say, a vertical

"transverse section of the ship taken anywhere in the bow or in "the stern (the keel of the vessel being neglected) will be a semi- "circle beneath the load water line."

"In constructing vessels to navigate very shallow water, I make "the vessel of the same or nearly the same width throughout, "and flat bottomed, and the ends of the vessel both at stem "and stern I make to a double curve, that is to say, from the "water line down to about one-half of the draught of the vesse "I make the surface concave, and from thence to the bottom of "the vessel I make the surface convex."

[Printed, 4d. No Drawings.]

A.D. 1861, February 9.—N° 326.

RICHARDSON, Charles James.—"Improvements in the "armour or metal covering for iron-cased ships of war." The improvements consist in applying such armour, not in the ordinary way of flat iron plates, but in the form of shields of a projecting conical form, having broad slightly curved projecting lips or bases, so that shot striking such shield either in a vertical, straight, or oblique direction, may glance off and not penetrate the vessel, and that where they pass along the surface of the shield their course may receive a curve or inclination, which will send them over towards the quarter from whence they came.

"The transverse sections of the shields at a moderate distance "from the vessel would be either oval or circular. The projec- "tion allowed to such shields would be regulated by the greater "or less obliqueness of the sides of the vessel to which they were "attached. Where they had a bold projection their metal cover- "ing (by preference of iron) need not be of uniform thickness. "They can be made of a size sufficient to cover two or more "fighting decks, or placed in two lines one above another. I "prefer their width to be from centre to centre of each pair of "portholes, their height from the line of flotation to the level of "the top deck of such a vessel as the Warrior, the new iron-cased "ship, but they can be made so as to sink below the line of flota- "tion, and as high as may be considered necessary."

"The form of the portholes piercing these shields I prefer being "made either circular or oval, and to have the same projecting "lip or rounded base carried round them as round the base of "the shields.

"The shields can be made either to form part of the construc-
" tion of a ship or vessel in combination with its framing, or they
" can be made so that they can be taken off and applied at will."

"The protective metal of the shields is securely backed by
" thicknesses of timber, both connected or fastened to an inner
" framework of iron, which may either form part of the framing of
" the ship or vessel itself, or be securely fastened to it."

"When it is necessary to take large bolts through the metal
" shields to the framework of the ship, I protect the heads of such
" bolts by large circular projecting bosses of iron, and I introduce
" these bosses on the flatter portions or bases of shields, so that
" they may aid in causing the shot striking them to glance off or
" from the vessel."

[Printed, 10*d*. Drawing.]

A.D. 1861, February 11.—N° 346.

THOMPSON, Nathan.—"Improvements in machinery for
" preparing wood for boat-building and other uses." "The first
" part of this invention consists of an improved sawing machine;
" the said machine has a bed so arranged that it may be made to
" traverse past the saw with the timber fixed upon a table carried
" by it, in such manner that the saw may be made to effect either
" a straight cut or a tapering cut, or alternately the one and the
" other, as may be required; as, for instance, for cutting out
" timber to form ribs for boats, in which case it is necessary to
" make them taper gradually from the keel portions upwards.
" And in order that various thicknesses of timber may be placed
" in the machine to be operated upon by the saw, the 'fence'
" mounted on the table, and against which the timber to be cut
" lies, is made adjustable. This fence carries three or other suit-
" able number of 'dogs' for holding the timber. The two end
" dogs, or those at either extremity of the bed, are arranged to
" travel lengthwise, so as to be capable of taking and holding
" between them a greater or lesser length of timber, while the
" central dog has not this movement. All the dogs are capable
" of being moved in a transverse direction, in order that the ends
" of the timber carried by them respectively may, as required, be
" caused to approach nearer to or recede from the line of the saw,
" according to the extent of taper required to be given to the
" timber or rib longitudinally."

"In addition to the movements just described, the table and " bed are connected together by hinges or centres, so that the " timber may, when required, be presented to the action of the " saw in an inclined position. This last-mentioned movement to " the table is given by means of a lever handle fixed to an axis " carried by the bed, and having thereon pinions taking into " racks carried by the hinder portions of the table.

" In order to secure the table in any required position. there is " a toothed segment with ratchet teeth and an " adjustable " stop, " against which the lever handle on the axis of the pinions just " referred to rests. Suitable mechanism is also applied to move " the fence, and also the timber carried thereby forwards, towards " the saw or away from it, without altering the inclination of " the table. The saw employed is of a circular form, and the " timber to be cut is carried past it as already described. As soon " as a cut is made, and the timber has entirely passed the saw, a " change of motion caused by a suitable clutch is given, and the " return movement of the bed, table, and fence with the timber " is caused to take place, and thus the machine is equally appli- " cable for operating on short timber or long lengths."

" Another arrangement, when sawing bent tapering timber into " ribs for boat-building, consists of a table or bench and a " circular saw arranged for cutting them with parallel sides, for " which purpose on the table or bench are two fences, one on one " side of the saw rising to a height suitable for having pressed " against it the one edge of the bent timber, the other fence " having its edge in a line with the edge of the saw. The first " mentioned fence is capable of being adjusted to and from the " same, and according to the form of rib desired to be cut, by " which arrangement, as the bent timber is moved to and past " the saw, the rib or piece cut off will pass on one side of the " edge of the second-mentioned fence, and the bent timber from " which the rib is cut will pass on the other side of such fence."

" In cutting timber into suitable forms for the stems and stern- " posts, an apparatus or machine is used consisting of a circular saw " table, so arranged with a fence that by reason of the surface of " the fence inclining to the saw, according to the extent of bevil " desired, the piece of timber to form a stem or stern-post is fed " in towards the saw whilst it is held firmly against the fence " and when the cut is made there is an adjustable piece, which is " made to slide on the fence already mentioned, which presents a

"face at an opposite angle to the previous face, and the piece of "timber which has had one side cut is then again fed up to and "cut by the circular saw, and is cut thereby on the other side to "an opposite angle. When forming transom thwart knees and "breast hooks a pattern or form is used," and is fixed on the piece of timber, "and I pass the edges of the piece of timber "against revolving cutters (either saws or plain cutters) until "such of the projecting parts of the piece of timber" as "extend "beyond the pattern or form have been cut away, and the edges "have received the bevil desired."

"In order to cut the ribs used when constructing clinker-built "boats with steps or recesses for receiving the edges of the "planks or streaks I cause the ribs to be acted upon by circular "cutters; and in order that the inclines or steps, as they vary, "may be correctly produced or cut, I employ two fences or "guides, one fixed and the other moveable, the moveable one "extending beyond the fixed one. The ribs to be recessed or cut with steps are placed across these two fences and there held, "and whilst so held they are acted on by revolving cutters, and "the various inclines are produced by bringing the moveable "fence nearer to or removing it further from the fixed fence."

[Printed, 1*s*. 6*d*. Drawings.

A.D. 1861, February 25.—N° 482.

CLARK, George.—"An improved method of connecting and "fastening together blocks, plates, or slabs of wood, metal, or "any other material." This invention consists in making and using bevelled or dovetailed grooves or slots on one side of plates of metal, wood, or other material, and of bevelled bars or tongues, fitted into and passing through such grooves or slots, as a means of connecting and fastening the plates.

If the invention be applied to covering the side of a ship or battery with iron, "I recommend that the plates be oblong, and "in length about three times the width; that the bevelled "grooves or slots (in number two, three, or more, according to "the length of each plate) be cut or otherwise formed in the "process of mannfacture across the width of each plate; that "metal tongues be affixed vertically, and screwed or bolted in "their places to the frame and skin or planking of the ship "before the iron armour plates be attached."

This arrangement being made, the plates are reeved on to the tongues, in strakes, breaking joint. Each plate is fastened to the side of the ship by means of as many bolts to each tongue as the size and weight of the plate may require.

"In applying my invention to covering ships of war with "armour plates, it being my principal aim to protect the fasten- "ing of the plates from the effect of projectiles, instead of pass- "ing bolts through the tongue itself, whereby it would be "weakened, I propose in manufacturing the tongue to add to it "a strong bar, which I call the tongue plate or bar into and "through which the bolts forming the fastening are passed." By this plan "the bolt heads are more effectually protected, and "the amount of screw power is greatly increased.

"For the purpose of giving greater solidity to the backing "and fastening of the armour plates, and to afford a purchase "and point of resistance of adequate strength to the nuts of the "screw bolts, whereby the tongues and the plates with them are "drawn to their bearings, I propose also to place a strong iron "plate of suitable thickness inside the skin of the ship between "the timbers, and fastened by screw or rivet bolts to the angle "irons and ship's plates. This back support" "is the bearing "plate, against which the screw bolts are heaved up, and the "armour plates are drawn to their bearings." "Instead of a "strong iron plate, this back support may be timber, 6 to 12 "inches thick, with or without any iron plate over it."

[Printed, 8*d*. Drawing.]

A.D. 1861, February 28.—N° 513.

HAY, William John.—"An improved glue or composition "suitable for covering the caulking of ships, and other like pur- "poses, for uniting wood and other substances, for filling up "seams, and for use as a waterproof glue or composition "generally."

This invention is an improvement on a former one by the same Inventor (N° 186, 1858). The object of it is to render the composition more elastic and free from disagreeable odour, "for "which purpose instead of oil or crude naphtha and rough creosote "as a solvent for asphaltes and caoutchouc, I use resin oil, and I "form my new composition of the following ingredients, melted "and mixed together:—The different varieties of asphalte or

"natural bitumens, vegetable tar, resin oil, with or without "caoutchouc.

"I also sometimes use vegetable pitch or resin in lieu of vegetable tar, with the asphaltes and resin oil, with or without the "addition of caoutchouc.

"I also use spirit of turpentine, vegetable naphtha, or any "other spirit or essential oil."

[Printed, 4d. No Drawings.]

A.D. 1861, February 28.—N° 520. (**)

ROSE, WILLIAM, and CROWDER, THOMAS.—"Improvements "in apparatus employed for raising and supporting ships and "vessels."

According to this invention "a hollow platform is employed, "divided into separate chambers or compartments, having openings and valves for admitting water to flow into and from the "several chambers or compartments; provision is also made for "forcing air into the several chambers or compartments, so as to "force the water therefrom when it is desired to float the platform and vessel thereon. On the upper surface of the platform "a suitable cradle and apparatus is constructed, all of which is "similar to what has before been employed; but according to "this invention suitable mechanism is applied to insure the "platform sinking and rising horizontally, or parallel to the surface of the water, however unequally the platform may be "loaded. The arrangement of the mechanism for this purpose "may be varied; it is, however, preferred to employ in combination with such platform, and on either side and end thereof, "apparatus similar to what is employed in constructing a parallel "rule; and such apparatus in each case consists of a bar, by "preference of wood, though it may be of iron or other metal, "in which case it is preferred to be hollow, and capable of floating. To the under surface of this bar several links or rods are "attached at intervals by pin joints, and the lower ends of such "links or rods are fixed to the bottom of the dock or other place, "and as such links are all of the same length such bar will at all "times be parallel with the surface of the water; on the upper "side of the bar there are other similar links attached by pin "joints, their upper ends being attached by pin joints to the platform, and as such an arrangement of apparatus is applied as

" above stated on each of the two sides and at each of the two " ends, the platform, when sinking, and also when rising in the " water, will be caused to sink and rise parallel to the water's " surface. It is not essential that the lower ends of the parallel " rods or links should be fixed to the bottom of the dock or other " place, or that the upper ends should be attached to the plat- " form, as their upper ends may be attached to the upper parts of " piles or any suitable structure above the water, and the lower " ends of the parallel rods or links may be attached to the plat- " form. Provision may be made for allowing the platform, when " it has come to the surface, to be detached, so that it may be " floated with a ship or vessel thereon to shallow water so that " the dock or other place containing the deeper water may be " again and again used with other similar platforms, to raise " other ships or vessels out of the water.

" It is not essential that each arrangement of mechanism should " consist of two sets of parallel links or rods and an intermediate " bar, as a single set of such parallel rods or links might be used " on two opposite sides of the platform, but in such case provision " must be made for the platform moving endwise in place of " rising and sinking perpendicularly. In place of using parallel " links or rods, as above explained, a series of endless chains may " be employed, each chain passing round two chain wheels on " parallel axes, the one axis being at or near the bottom of the " water, and the other above the water, so that one chain cannot " move faster than the other chain, and by using two such axes " with their chain wheels and chains at each side and at each end " of the platform, the same may be caused to sink and rise parallel " with the level of the water."

" The platform may be constructed in separate sections, capable " of being joined and used together, or the sections may be used " separately, the mechanism applied thereto for obtaining the " parallel action being varied accordingly."

[Printed, 10*d*. Drawing.]

A.D. 1861, March 2.—N° 533.

GRIFFITHS, Robert.—(*Provisional protection only.*) — " Im- " provements in the arrangements and construction of armour or " iron-clad steam or other ships."

This invention has for its object the arrangement and con-

struction of such portions of iron-clad ships as are intended to resist shot or shells, and consists in constructing such portions of the ship with sufficient space between the outer skin of the ship and the inner skin, to allow the armour plates to be placed there when required; the object being to enable iron-clad ships to take out their armour, and be used without it for general purposes, while they can readily ship it, or any portion of it when required.

"It is not absolutely necessary that there should be an inner " skin to the vessel to secure the armour plates to the outside " skin of the ship, as they can be secured to ribs of T-shaped iron, " rivetted to the outer skin; the armour plates" sliding "in " between."

"I also propose making the spaces considerably wider when " not required to be solid shot-proof, but only shell and rifle " ball-proof, which spaces can be filled with fuel, and which " could be taken out and used in the engines in cases of " emergency."

[Printed, 4*d*. No Drawings.]

A.D. 1861, March 4.—N° 544.

HADDAN, John Coope.—(*Provisional protection refused.*)— " Improvements in and in the mode or modes of applying " and securing the metal plates of armour-plated ships or " vessels and other armour-plated structures." The invention has reference partly "to the improved disposition of " the " plates and the formation of the joints, or securing or placing " together the edges of the plates, whether with or without the " assistance of stringers, and embraces the arranging the plates to " lap or partly lap one over the other, after the manner of weather " boarding, so as thereby to obtain an inclined surface, that is to " say, inclined with regard to the general line or system of plates " And the forming and arranging or disposing the plates and the " bolts or rivets or fastenings, so that the edges may lap and " cover the bolts or rivets, or fastenings, and so that the edges " of one plate or row or set of plates may lock into and dovetail, " or so fit against those of another" "as that the fixing or " securing of the one may consequently ensure the fixing or " securing of the other. And the producing such locking, dove- " tailing, or securing quality or character to or upon the edges, " either with or without flanges, ribs, or projections beyond the

" general thickness of the plates as manufactured, and by planing " or cutting, or otherwise forming the edges or parts of them " to the desired shape. And the locking or securing together of " adjacent plates with lapped edges by wedges or key-pieces, or " tongues. And the securing, holding, or clipping the edges of " plates by means of projecting stringers lapping over and inter- " posed between the pair of edges. And the securing, holding, " or clipping by non-projecting stringers (as in Lancaster, Brown, " and Hughes' recently specified inventions with reference to " ordinary plates,) my improved manufacture of compound " armour plates," "the edges of the plates being inclined, or so " shaped for the purpose, and the flush stringers being made as " in their plan to correspond, so that the parts may properly " dovetail or lock together. And the so forming, arranging, and " disposing the plates and their edges as that while constituting " butt joints at and adjacent to the external surface of the vessel " or structure, or scarf joints (as the case may be), the edges or " returns of the plates at a short distance away from such exter- " nal surface shall clip, embrace, or hold between them stringers, " tie rods, or plates for bolting or securing to the skeleton or " framing of the vessel or structure, so as to conceal or protect " them."

The invention has reference also to the manufacture of the plates, and consists "in constructing or forming them of the " desired thickness by rivetting or securing together two or more " thinner plates, and when with more than two plates, either so " that the rivets or fastenings may pass completely through the " mass or otherwise, so that the several separate rivets or fasten- " ings may pass through only the platès in contact with each " other, or through two or three adjacent plates, but not through " the mass, and in such case so that the rivets in the various " laminations or strata forming the mass may not come opposite " to each other, but may break joint with and properly bond or " bind the parts together. It is apprehended that plates so con- " structed will be less penetrable than if of solid metal. The " edges of the plates may be welded together."

[Printed 4*d*. No Drawings.]

A.D. 1861, March 13.—N° 620.

MUNTZ, GEORGE FREDERICK.—" Improvements in sheathing " *iron ships or vessels.*" These improvements consist in sheath-

ing iron ships or vessels with sheets of compound metal, containing copper and zinc, such sheathing being attached by means of india rubber, to iron sheets, according to Dafts' patent process of coating (described in his patents of 22nd November, 1859, No. 2643, and the 28th January, 1860, No. 227), such iron sheets being then fixed to the ship's side or bottom by screws, rivets, or other convenient fastenings, in such manner that the compound metal sheathing shall be insulated and separated from the iron by the india-rubber.

The nature of the process above referred to is as follows:—" I " take a sheet of iron of the size of yellow metal sheets for " sheathing ships, and about $\frac{3}{16}$ths of an inch thick, and having " scoured or cleaned the surface so as to clean it from scale or " rust, I place it upon the plate of a press corresponding with it " in size, and upon the sheet iron I place a sheet of clean " sulphurized india-rubber of the same size, and about $\frac{1}{16}$ thick. " I then take a piece of yellow metal sheathing and pierce holes " of about $\frac{3}{8}$ of an inch diameter, and about four inches apart " round the edges of the sheet, the holes being made one inch " or thereabouts from the edges of the sheets, and then clean " the sheet and free it from oxidation, and in this state I lay it " upon the sheet of sulphurized india-rubber, so that the sheet of " india-rubber is between the sheet of iron and the sheet of " yellow metal. I then place over these three sheets the top " plate of the press, and cramp the whole together so as " to cause intimate contact between the sheets and india- " rubber, and to entirely exclude the air. Whilst held to- " gether in this way I place them in a chamber heated by " steam for the purpose of vulcanizing the india-rubber as is well " understood, and which process of vulcanizing causes adhesion " between the sheet iron and yellow metal." " The three sheets " being now firmly fixed together, I pierce holes of about $\frac{1}{4}$ of an " inch diameter through the iron and india-rubber in the centre " of the holes previously pierced in the yellow metal, and I attach " such sheets to the side of an iron ship by first drilling holes " to agree with the piercings of the iron sheets attached to the " india-rubber and yellow metal, and of a depth short of the " thickness of the plates so drilled. I then with suitable iron " nails or rivets," or screws " with heads small enough in " diameter to escape touching the yellow metal," " nail or rivet " on the iron sheet, and thus the yellow metal is held fast

" to the iron sheet without touching it by means of the india-
" rubber, which at the same time insulates it."

[Printed, 4*d*. No Drawings.]

A.D. 1861, March 14.—N° 629.

GEDGE, William Edward.—(*A communication from Joseph Dauphin St. Supery*).—(*Provisional protection only*).—" Improved " apparatus for saving life at sea or in other waters." " The first " of the combinations is to superpose one cylinder on another " (both being surrounded with metal tubes) and placing a ballast " compartment under the lower one. The upper cylinder being " filled with air the lower sinks or partly sinks, the upper supports " the person, and the whole is steadied by the ballast. This plan " is modified and rendered less inconvenient by dispensing with " one cylinder. The party now sits on the cylinder (which is filled " with air when in use) a hole being made both in the cylinder " and the ballast bag underneath in which the legs are placed. " Or a large air seat is made (pointed at one end to fend off the " waves) and with a hole or bag for legs in its centre. Round " this several air tubes are placed, serving as floats, or a circle " tube in two air-tight parts may be made with a cross tube, and " four or more straps or bands securing the whole and serving to " support the person who sits (as on horse-back) on the cross " tube."

[Printed, 4*d*. No Drawings.]

A.D. 1861, March 16.—N° 668.

MORGAN, Edward Charles.—" Improvements in protecting " ships and fortifications." " In order to apply iron and steel " plates with more advantage than they have heretofore been " applied, and more completely to prevent shot and shell from " penetrating into a ship," the sides are made " with angular pro- " jecting ribs in lines running in the direction from stem to stern." It is preferred to have three such angular projecting ribs, but the number may be varied. The lowest angular projection commences below the water line, its greatest projection coming considerably above the line of flotation. The next angular projection commences where the lower one finishes. " In the event of a ball or " shell striking the lower plates of the lowest angular projection,

" at a point below the apex or ridge." "the tendency would be to " cause the ball or shell to be deflected downwards into the water," " whilst if a ball or shell struck the lower iron or steel-plated " angular projection above the apex or ridge, the tendency would " be to cause the ball or shell to be deflected upwards and away " from the ship:" such would likewise be the action of the other projections. " These angular projections it is preferred should be " filled up internally with timber, and coated with strong plates " of iron or steel of such thickness as not to be liable to be pene- " trated by a ball or shell."

[Printed, 10*d*. Drawing.]

A.D. 1861, March 20.—Nº 694.

WATSON, JOSEPH, and DAVISON, THOMAS BENJAMIN.—" Improvements in the mode of applying and securing thowl pins " or rowlocks to boats, barges, lighters, and all craft propelled by " means of oars or sculls." A box or case of suitable form and size is to be affixed inside the boat, underneath or level with the gunwale. This box or case is to contain one or more thole pins, made to work in suitable grooves or guides. The thole pin or pins are to be connected at the bottom end or ends by a transverse piece, and in or about the centre of such transverse piece is to be affixed a pin or plug to project through a slot in such box or case, by means of which such thole pin or pins may be raised through openings in the top of the box, such openings to correspond in size and shape to the pins. The pins when raised are to be held in place by a slide, bolt, or other suitable fastening, underneath or through the pin or plug projecting through the slot.

The side of such box or case to be made to take off or open, to allow of broken or damaged thole pins being replaced or repaired.

The "pins, box or case, and internal and external fittings " thereof, to be made of wood, metal, or such other material as " may be deemed most suitable."

[Printed, 6*d*. Drawing.]

A.D. 1861, March 27.—Nº 762.

JEFFS, WILLIAM, and PENNOCK, JOSEPH.—" Improvements in steering ships or boats, and in apparatus connected " therewith."

The invention relates to the application of hydraulic power "to the steering of ships or boats. For this purpose we employ "a cylinder, within which is a piston, on either side of which "water can be forced by means of a pump, so that the said "cylinder is caused to travel in the one direction or the other as "may be desired. To the cylinder is attached a boss, turning "loosely, within which is a pin projecting from the tiller of the "rudder, which is capable of sliding therein; the cylinder, "therefore, being propelled, turns the rudder, and as the tiller "moves therewith it slides in the aforesaid pin. The pump" or pumps "for working this apparatus may be placed in any part of "the vessel, the communication being made by suitable pipes and "cocks. It may also be worked by steam power if desired, and "the water allowed to pass from more than one part of the vessel "by pipes and cocks."

The invention also refers to the use of the direct action of steam or other elastic fluid. For this application it will merely be necessary to admit steam by suitable cocks into the pipes, so as to allow it to exert its pressure within the cylinder, or to convert the hydraulic pumps into pneumatic apparatus, in which case the necessary power may be obtained by forcing air into the cylinder, or by exhausting it therefrom.

[Printed, 10d. Drawing.]

A.D. 1861, March 30.—N° 782.

SIMONS, WILLIAM.—(*Provisional protection only.*)—"Im-"provements in or connected with ships or vessels," for the purpose, mainly, of obtaining increased strength and protection. The improvements are as follows:—

1. In ships or vessels having iron thwart-ship bulkheads, the connecting of each bulkhead with the beams or stringer plates on one or both sides of it, by horizontal diagonal iron plates or bars, secured to the bulkheads, and along the upper or lower edges of the beams. The object is to provide a strong diagonal fastening, having the bulkheads as a basis of support, which system may be carried out in various ways.

2. Placing deck beams in reverse diagonal directions in the same range, the beams below or above each other in the different ranges being also in reverse *directions.*

3. "In constructing an iron ship or vessel, the erecting of "the thwart-ship iron bulkheads," and partial bulkheads, "and "the bending on the external vertical edges thereof of diagonal "iron plates or bars, rivetted to and having their basis of support "on the bulkheads." "On the framing thus constructed, the "external plating is secured and rivetted." "This system of "diagonal fastening may be applied, under various modifications, "either externally or internally to iron or steel ships or vessels, "the plates or bars being in all cases secured to the bulkheads, "and having their basis of support thereon."

4. "The diagonal trussing of the insides of paddle steamers in "such a way as to take advantage of the insides of the paddle "box framing, to form a strong trussed arch at a part requiring "extra support."

5. The application to paddle steamers of diagonal thwart ship tie bars, extending from the upper part of each paddle box, through the deck, down to the bilge. These diagonal bars may at their upper ends be secured to the paddle box platform, and they may also be rivetted to the vessel's beams. In a similar way the diagonal iron bars ordinarily used externally to support the paddle beam, and usually fastened below to the outside plating of the vessel, may be continued through the side, and be secured inside to the bilge, keelson, engine seat, or main keelson, or to the inside of the vessel's bottom or bilge.

6. Extending beams or bars from the wingwale of paddle steamers, diagonally across the vessel, to form a horizontal diagonal deck trussing.

7. In connection with fore and aft deck planking upon diagonal deck beams, or upon ordinary beams, the fastening of such planking, wholly or partially, with thwart ship diagonal seam bolts between the beams. By these means the deck is strengthened, vibration decreased, and a greater beam space permitted.

8. Substituting for the longitudinal bars, ordinarily fixed at slight distances apart inside iron vessels, for the protection of the cargo, of bars of various sections arranged diagonally in one or two lengths, well secured.

9. Forming and applying vertical, diagonal, or lattice truss bulkheads of iron in the coal bunkers, engine rooms, and other parts of steam vessels, or where from the space occupied by machinery or boilers, a direct thwartship connection cannot be

obtained. Entire bulkheads of this construction may also be applied to the holds of sailing or steam ships or vessels, or the transverse framing of a vessel may consist of such bulkheads to the entire or partial exclusion of the kind of framing commonly adopted.

10. Fastening timber on the outsides of iron war vessels, from about the water line to the gunwale, such timber being disposed diagonally in one or more layers.

11. Applying diagonal T-iron, angle iron, or bar iron trusses to the outsides of iron vessels, from about the water-line to the gunwale.

12. In war vessels formed with internal angular shields, according to the plan described in the Specification of Letters Patent No. 3, 1860, the filling up of the triangular spaces between the shields and the external timber side with timber, arranged with its fibres in any direction, but by preference athwart ship.

13. The constructing of the side of a war vessel with several thicknesses of iron and timber arranged alternately, the timber being disposed horizontally, vertically, or diagonally. The thicknesses may be varied, but ¾ inch for the iron, and 6 to 8 inches for the timber, are suitable proportions. Instead of timber, the spaces between the metal shells may be occupied by short tubes, or hollow cylinders, or prisms disposed transversely, so as to form a sort of "honeycomb," such "honeycomb" construction may be adopted with only two shells, an inner and an outer one.

14. The constructing of iron diagonal lattice-work yards, masts, or spars with long bars of T-iron or angle iron, alone or together, or in connection with flat bars and with internal horizontal transverse bars or bolts; or the spars may have throughout their length circular, solid, or perforated discs, secured to the inside of the lattice-work. Similarly, external hoops may be rivetted or otherwise secured to the outsides of such lattice-work yards, masts, or spars.

15. The rivetting of the bands of iron rudders upon the rudders themselves, instead of upon the stern posts, the axis being in the stern post, which is formed with apertures to receive the bands.

16. Making a vessel's iron mooring bitts hollow, with suitable communications with the cabins or hold, so as to act as ventilators, being provided with adjustable water-tight covers. Similarly pall

bitts, and other bitts passing through a vessel's deck, covering board, or waterway, may be adapted to act as ventilators.

[Printed, 4d. No Drawings.]

A.D 1861, April 5.—N° 837.

BURN, CHARLES.—" Improvements in ports and apparatus for " opening and closing the portholes of ships of war, which are " also applicable to embrasures of fortifications."

The objects of this invention are to obtain greater facility for opening and closing the doors or lids of portholes of ships of war when in action, so that they can be opened with ease and rapidity when it is intended to fire the gun, and be closed immediately the gun is fired, and to construct these doors or lids of sufficient strength and of such a form and manner that shot, shell, or other missiles cannot break or penetrate them.

" To effect these purposes I cover the porthole by means of " two iron doors, one above the other, the top one closing the " top half of the porthole, and the bottom one the bottom half, " abutting against each other when closed at the middle of the " porthole; these doors move up and down between guides fixed " to the sides of the ship. The upper door is hung on chains " which pass over two sheaves or pulleys to the lower door, " to which they are fastened." By this means the weight of one door balances the other and they move simultaneously. " The doors may be opened or closed by a direct downward " pressure or upward pull from a handle or horizontal bar fixed " to the lower door, or they may be raised and lowered by means " of levers or other suitable contrivance. To offer the greatest " resistance to shot, shell, or other missiles, the doors are made of " hammered iron or steel, and when closed form a diamond- " shaped surface presenting four angular faces."

[Printed, 1s. Drawings.]

A.D. 1861, April 9.—N° 875.

NEWTON, WILLIAM EDWARD.—(*A communication from Hamilton Towle.*)—" Improved apparatus for drawing bolts." " The appa- " ratus consists principally of a hollow screw, at the lower end of " which is adapted a pair of spring jaws provided internally with

"serrated or roughened surfaces, so as to enable them to grasp "and hold the head of the bolt firmly. This hollow screw passes "through a female screw made in the boss of a wheel, to which "rotary motion may be communicated by means of suitable gear-"ing. The wheel containing the female screw is held in its place "by a ring or other suitable contrivance, which will secure it to "the fixed framing, and yet allow it to rotate on its axis." The operation of the apparatus will be as follows:—On its being applied to or placed over a bolt the jaws are drawn back upon the inclined surfaces upon which they rest by a tube or ram. They are at the same time forced apart or opened by a circular spring. They are then ready to grip the head of the bolt, which operation will be effected by the jaws being forced or driven upon the head by the advance of the tube or ram, which is free to move the length of certain slots or openings. Upon power being applied to the hollow screw, through the toothed wheels or gearing, the jaws will be caused to grasp the bolt so firmly as to remove it, if the power be continued to be applied, so as to draw up the screw and the jaws with it. "If the bolt to be drawn is longer than "can be drawn at one pull, the screw may be turned back and a "new hold taken, and the process continued until the bolt is "completely drawn out of the timber."

[Printed, 10*d*. Drawing.]

A.D. 1861, April 23.—N° 1005.

SAMUDA, JOSEPH D'AGUILAR.—"Improvements in the con-"struction of iron vessels of war." "I construct the top sides "of the vessel fore and aft, and for a sufficient distance below "water, of single thick plates (without backing by preference) "from four to eight inches thick, and I recommend that each "plate should be about twelve feet long and four feet wide. I "make all these plates to fit against each other at their edges, so "as to show a fair surface both inside and outside the vessel, the "plates of one strake breaking joint vertically with those in the "strakes above and below. Inside the vessel, and in a line with "each strake of the plates longitudinally, I place a wrought iron "rib, by preference of about 12 inches in width and 3 inches in "thickness, formed with an angle flanch on one surface of the "top and bottom of same, producing a trough-like section; "I rivet the plates along each of their edges with a row of large

" rivets in each plate to this rib, or otherwise secure the edges of " the plates to the rib; I then caulk the plates at their edges and " make them water-tight. Between the longitudinal ribs are " placed ribs of similar section, to serve as butt strips to connect " the plates where their ends butt together vertically, and I fix " the ends of the plates to such butt strips by rivets or other " suitable means. I arrange the width of the plates so as to " enable the longitudinal ribs to serve also for the reception of " the beam ends of each deck into which the beams are fitted and " rivetted, or otherwise attached. The longitudinal and vertical " ribs are thus made to serve the purpose of giving stiffness to " the whole fabric, as well as useful to attach the beam ends " to, and thus all necessity for vertical frames at the back of the " armour skin of a vessel is avoided, and great simplicity of con- " struction is attained. Below the portion of the thick armour " plate required to protect the vessel against shot (i. e. from about " four feet below water), I construct the hull or body of the " vessel with vertical frames and iron skin, as usual in large first- " class sea going iron vessels."

The special object of the invention is to incorporate the armour plate into the structure of the ship, and thus cause it to be useful in forming the top sides of the vessel, as well as its defence against an enemy's fire; at the same time it does away with the necessity of carrying vertical frames behind the armour plating."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1861, April 30.—N° 1077. (**)

LABAT, HENRI JEAN THÉOPHILE.—" An improved apparatus " for hauling ashore ships and vessels of all sizes and descrip- " tions."

According to this invention parallel grooved slides or ways are disposed upon a suitable foundation, and suitably inclined. On these are placed wooden blocks (one to each slide or way), the lengths of which are proportioned to the breadth of the vessel to be hauled up. These blocks are all connected together by brackets, cross ties, tie rods, and by two transoms or girders of sheet iron, which may be dismounted when required, and in which all the ends of the blocks take; the whole forming a cradle. The vessel to be hauled up " is chocked and shored up on the cradle, " as in ordinary for hauling up vessels, but in position trans- " verse to the ways." The upper girder is formed of two plates,

between which are placed capstan barrels "or simply pulleys, "according as chains or hawsers are employed." The hauling is effected by two chains, which are so arranged as each to act "on "a separate half of the width of the cradle," and "gear with "pulleys," to which motion is given by a steam engine. The chains are passed round these and certain other pulleys, so arranged that each end of the chains becomes "taut right and "left to an equal degree," and "the cradle will receive the same "speed and tractive force, which will be transmitted to all points "in the like proportion. The same effect is produced in lowering "the cradle on the ways, the arrangement being reciprocal, as it "is only necessary to work the gearing from the back end, and "regulate the speed by means of a brake placed on the horizon-"tal shaft to ensure great regularity in launching."

"This apparatus may also be used in launching vessels, either "end or broad side on to the shore."

[Printed, 10*d*. Drawings.]

A.D. 1861, May 9.—N° 1175.

BURCH, Joseph.—"Improvements in constructing and in "machinery or apparatus for propelling ships and vessels." The invention consists, firstly, in the use and application of iron for constructing the after or buttock parts of ships and other vessels, and in attaching such iron sterns to the hulls of screw steam vessels which are otherwise built of wood.

In narrow canal steamers, for example, "where but a limited "space can be spared for the machinery, I have found that "planking up to a wooden stern post will not stand the vibratory "strain from the screw; wood planking is also soon affected by "the heat from the boiler, it soon becomes so shrunken and "dried that a leaky state of the vessel is sure to be the result. "By the use of iron this objection is removed, and greater "strength is given to those parts which have to bear the constant "strain and vibration which chiefly" occurs "about the stern "post. The iron stern should be of sufficient length to contain "the boiler and machinery." By means of this combination "of materials I am enabled to construct vessels possessing all "the strength and advantages of iron screw steamers," with economy of cost.

2. In the peculiar form of such iron sterns when used in the construction of canal steamers, according to which, "although the

" lines below water have a fine run, which is for the purpose of " getting a clear way for the water to feed the propeller, the lines " above water, forming the upper part of the boat, continue on " to nearly the full breadth of the vessel; the horizontal plates " uniting the two form a stern deck, the use and object of this " arrangement, which is only required in vessels employed in " inland navigation, is chiefly for the purpose of effectually pro- " tecting the fins of the screw propeller." When the boat is laden this stern deck bears upon the water, and thereby gives additional buoyancy to the stern.

3. In the use of shifting propeller fins or blades, which are constructed entirely of wrought iron or malleable metal.

4. In the application of propellers to ordinary sailing vessels, chiefly to be used during calms or head winds as auxiliary screws.

[Printed, 10*d.* Drawings.]

A.D. 1861, May 11.—N° 1197.

WILSON, WILLIAM.—" Improvements in the manufacture of " wooden keys and treenails for railways and shipping, and in the " machinery employed therein." The improvements in keys consist in sawing and planing them taper, by improved machinery, which ensures uniformity in size and shape, and an easy entrance into the chair.

The improvements in treenails consist in making them parallel three-fourths of their length, and then taper or conical to fit the chair, the head of the treenail to be convex.

" I subject the wood (oak, elm, or other kind) to a chemical " process by boiling in linseed or other oil until thoroughly " saturated, and then dry it by heat or otherwise; thus prepared " they stand driving much better than any now in use, and after " being driven into the sleeper are caused to expand. The action " of the sun on the keys also produces no contraction."

The improved machinery for manufacturing the keys consists of a frame carrying a cutting tool, " which frame is made to move " up and down on standards to bring the cutting tool to act upon " the wood; the wood itself is supported against a guide or guage " upon a table hinged in such manner that the position of the " wood may be altered to obtain the cut required by inclining the " *table.*"

[Printed, 10d. Drawing.]

A.D. 1861, May 11.—N° 1198.

LANCASTER, CHARLES WILLIAM.—"Improvements in "armour plates or bars for protecting ships and other structures, "and in fixing the same." The invention consists "in rolling or "otherwise forming armour plates or bars of iron, steel, or other "suitable metal or compound of metals with a flange or rib on "that part of the plate or bar which is to be the inner side thereof "when fixed, through which flange bolts, screws, or rivets for "fastening the plates, as also through or into the side of the "ship or other structure, are driven and secured. The top and "bottom of the plates or bars are recessed, grooved, or formed in "any such suitable manner that one bar or plate shall fit or "dovetail into that immediately above and below it; and also "that the flange on one plate, through which the bolts or rivets "are passed, shall be covered and protected by the plate next "above or below it."

[Printed, 1s. 8d. Drawings.]

A.D. 1861, May 11.—N° 1202.

JONES, GEORGE FOWLER, and JONES, JAMES.—"Improvements in the form and construction of ships or vessels, and of "arched ribs for roofs, domes, and bridges."

The invention consists, firstly, "in making the vertical section "of vessels of war, such as gun-boats, or floating batteries, of "an oval form, such form of construction giving to all parts the "greatest amount of strength, and presenting a large receding "surface to the action of shot discharged against it, and this "form of section being continuous, the gun deck is under a "domed shot-proof cover, thus protecting both the men working "the guns and the latter from exposure on an open deck." "For use when under sail or steam, moveable bulwarks and outer "decks are provided, and made in compartments of lighter metal, "hinged to the oval sides, and easily lowered when in action."

And, secondly, in the construction of iron vessels, whether of war or commerce, and of arched ribs for roofs, domes, or bridges, "of plates of a box form, flanged and bolted or rivetted together "at the sides in longitudinal succession for ribs, and concurrently "therewith in *lateral succession* for broad surfaces, and honey-"*combed, ribbed, or plain* on the inner surface; by which means

" great resisting power is obtained with diminution of weight; " the flanges, bolts, rivets, and fastenings are easily got at; the " action of the water on rivet heads and holes is avoided, a " smooth surface is presented outwards, and superior facility is " secured for renewing damaged plates. The plates, as regards " their length, may be laid horizontally, perpendicularly, or dia- " gonally, but any way to break joint, and to be so arranged as " that their ends bear solidly against ribs or other framework."

[Printed, 1s. 4d. Drawings.]

A.D. 1861, May 11.—N° 1205.

CLARK, WILLIAM.—(*A communication from John Theodore Scholl.*)—" Improvements in the construction, ventilation, and " propulsion of life boats." This invention consists, firstly, " in " constructing the body of the boat in the form of a cylinder, " terminated at each end by a cone, or by a bow and stern some- " what similar to that of common boats, the same being made " waterproof and collapsible or non-collapsible. The hull of a " collapsible boat is constructed of plates suitably hinged to- " gether, and rendered waterproof at the joints." " The non- " collapsible boat has a bow and stern not unlike boats hitherto " made, and is constructed of solid timbers, which are put to- " gether rigidly." A circular head or disc, composed of three " sections hinged together, is placed within each end of the " cylindrical hull of the collapsible boat, so as to render its col- " lapse impossible, the middle section of each head being nearly " equal in width to the middle plates." " All the joints of the hull " may be made water-tight by introducing some compressible fa- " bric between them, which will not interfere with the folding of " the parts. The entire inside surface of the cylindrical hull may " also be lined with a suitable waterproof material, which should " pass into the joints, and be suitably secured to the plates inside; " or this waterproof material may be cut into narrow strips, and " suitably secured over the joints of these plates, so as to admit " of collapsing and dilating the hull."

2. " In suspending a carriage or platform within a cylindro- " conical boat, whether the boat be made collapsible or non- " collapsible, and in furnishing said platform with seats, and " otherwise constructing and arranging it within the boat, so " that the level position of the platform will not be changed,

" though the hull of the boat perform complete revolutions, for " which purpose I provide a rolling carriage, furnished with " transverse suspended seats, either to roll inside the cylindrical " part on a railway, or to roll about a concentric sleeve, fixed and " well braced within each end of the cylindrical part of the non- " collapsible boat."

3. " In arranging spring valves to close suitable air-holes made " in the periphery of the hull," when such holes " are below " water, and not acted upon by an arch-piece attached to the " before-mentioned carriage, which opens such holes as are above " water; thus fresh air can be constantly admitted."

4. " In propelling the collapsible boat by means of rods or cranks " placed between the seats, and so connected with oars or a screw " propeller, that every passenger can assist in advancing the " boat."

5. " In arranging a novel form of rudder at the bow of the " non-collapsible boat in such a manner that it can be operated " by persons inside thereof when the boat is revolving in a high " sea, which apparatus consists of a rod fitted at one end of and " parallel to the axis of the boat." After leaving the bow, " this " rod has an obtuse bend, and just beyond the angle of this bend " it carries a plate for steering. This rudder is rotated by means " of a crank fitted to the rod inside the boat, and as the greater " part and weight of the plate is below the point of suspension, " it will remain in a vertical position even when the rod is " rotated, while a wave could only temporarily change its position " from the vertical without interfering with the action of the " rudder. This rudder can be used even while the boat is re- " volving, and it is not easily washed away, because it evades the " shock of the waves."

" In the employment of extension levers arranged within the " hull of the boat, and connected with the folding heads thereof, " for the purpose of collapsing or dilating the boat, and keeping " it in either condition. These knee levers are arranged between " two stout plates of metal, which plates, when forced together " by a screw and crank, with which they are provided," will straighten the levers, and fold the circular heads of the boat, to which they are connected, and with them the whole boat.

In applying buoyant fenders made of some stout and elastic fabric, and made hollow inside, which are placed on each side of the boat, and when uninflated will keep off violent blows from or

against hard substances: "when inflated from the inside of the "boat by means of a bellows, the boat will be made a great deal "more steady while it is buoyed up; it also answers the purpose "of receiving passengers, or permitting them to get out."

Printed, 1s. Drawings.]

A.D. 1861, May 18.—N° 1275.

HUGHES, JOHN.—"Improvements in plates to be used in ships "and other structures for receiving armour plates or bars, and in "the means of fixing such armour plates." The invention consists in rolling plates with three or more projections or ribs, by preference in the direction of the length of the plates. "I then "plane across the ribs and remove part thereof, so as to leave the "projections or ribs in the form of dovetail tongues, that is, with "the sides angular and undercut. I then fit correspondingly "grooved armour plates into the recesses left between the tongues "in the plates, and secure them by keys, which are driven in to "fill the whole space between every pair of tongues not occupied "by the dovetail tongue on the armour plates. The tongued "armour plates may also be secured by bolts or rivets."

[Printed 6d. Drawing.]

A.D. 1861, May 20.—N° 1287.

ROBERTSON, ANDREW JOHN.—"Improvements in the con-"struction of ships and vessels." In constructing ships and vessels according to this invention, in order to decrease as much as possible the resistance offered to them by the water in passing through it, "I make the load water line concave both at the bow "and stern, and beyond these concave portions in passing into "the body or centre portion of the vessel the line becomes convex, "and in combination with this formation of the load water line of "a ship or vessel the vertical lines throughout both the bow and "the stern of the ship, in passing from the load water line on one "side to the same level on the other side are semicircular, that is "to say, a vertical transverse section of the ship taken anywhere "(the keel of the vessel being neglected) will be a semicircle be-"neath the load water line."

In order to reduce as much as possible the resistance to a ship in which all the transverse sections may not be semicircular, "I "construct the ship in such a manner that if a midship section of

" it be taken and any normal (a line perpendicular to a tangent) " to the curve of this section be drawn until it intersects the ver- " tical centre line, then a plane passing through this line and at " a right angle with the plane of the midship section (which is " vertical), will where it intersects the surface of the ship or vessel " make the line of intersection a hollow curve both at the bow " and stern, and passing into the body or centre portion of the " vessel the line becomes convex."

" In constructing vessels to navigate very shallow water I make " the vessel of the same or nearly the same width through- " out and flat-bottomed, and the ends of the vessel, both at stem " and stern, I make to a double curve, that is to say, from the " water line down to about one-half of the draft of the vessel I " make the surface concave, and from thence to the bottom of the " vessel I make the surface convex."

[Printed, 10*d*. Drawing.]

A.D. 1861, May 20.—N° 1289.

HUMPHRYS, Edward.—" Improvements in the construction " of iron ships, batteries, and forts." " This invention consists " in building iron ships, batteries, and forts entirely or in part of " solid plates or forgings of iron with internal flanges. The plates " are so formed as to admit of their being bolted together on the " internal surface, whereby, in the case of ships, the usual frames " of angle iron may be dispensed with, and in the case of batteries " and forts structures of great strength may be formed."

" The flanges are formed on the armour or other plates, either " all round their inboard edges or on their horizontal edges only, " or on their vertical edges only, and where such flanges are " omitted both plates are grooved, a steel bar or tongue being in- " serted into such groove."

[Printed, 10*d*. Drawing.]

A.D. 1861, June 1.—N° 1369.

WIGZELL, Montague.—(*Provisional protection only.*)—" An " improvement in the form of iron, steel, brass, copper, and other " metallic alloy for making nails, spikes, bolts, screws, and other " similar driving articles, both plain and twisted." " The im- " provement consists in drawing, rolling, cutting, forging, press-

" ing, stamping, and indenting iron, steel, brass, copper, and " other metallic alloy, in the form of bars, rods, sheets, strips, and " wire, so as to give them a fluted, grooved, or indented form " (whilst hot or cold, of any shape, size, diameter, or thickness, " that may be required), for the purpose of making nails, spikes, " bolts, screws, and other similar driving articles, and also for " twisting them in long or short lengths for the purpose of manu- " facturing the twisted and fluted (and fluted without being " twisted) nails and other similar driving articles of a fluted, " grooved, or indented section."

[Printed, 6*d*. Drawing.]

A.D. 1861, June 3.—N° 1388.

ARBUCKLE, George Benjamin Vaughan.—" Improve- " ments in armour coating for ships, fortifications, and other " structures." The invention " consists in applying iron armour, " bars, plates, or coatings to vessels, fortifications, and other " structures in a curved, or series of curved and wedged forms " in such manner that each separate plate or bar when struck " derives support from those plates or bars contiguous to it, as " also in providing a conical or approximatively conical embra- " sure or port-hole."

" For ships, in order to render them light, and therefore capable " of carrying either a greater armament or more coal, the iron is " disposed on a totally different principle from that now in use." At present, from the water line and below it to the upper part of the vessel, the iron is of the same uniform thickness, " whereas I " place the iron of different thicknesses, for where the vessel can " be struck horizontally, or nearly so, I place the iron very thick, " but according to the curve, so is the thickness."

[Printed, 10*d*. Drawing.]

A.D. 1861, June 4.—N° 1401.

FORD, John.—(*Provisional protection only.*)—" Improvements " in ships' rudders." The invention consists, firstly, " in fitting " the bottom of rudders with a spindle, and in so pivotting them " upon a frame or shoe projecting backward beyond the rudder " post that about one-third, more or less, of the rudder may, when " fixed, be in front of a vertical line drawn in a line with the " spindle."

2. "In affording protection for the heads of rudders generally, " by passing them through an aperture made in a forging or forg- " ings, which extend from the water line, or below it to the deck " of the ship."

[Printed, 4d. No Drawings.]

A.D. 1861, June 6.—N° 1425.

STRATFORD, Charles.—(*Provisional protection only.*)—" An " equilibrium steering apparatus." This consists of a fan or blade "placed at the stern, bows, or stern and bows of vessels, " such fan or blade being worked by a vertical spindle, the " spindle being placed in the centre of the fan or blade, so that " upon the fan or blade assuming any angle with the line of keel, " two columns of water from the two respective sides of the " vessel will impinge upon the fan or blade with equal force upon " each side of the spindle or centre of motion, the entire force " being received upon the inclined surface of the fan or blade, and " thrown off in a lateral direction on one or other side of the " the vessel, the reacting force causing the vessel to turn either " way as required."

[Printed, 4d. No Drawings.]

A.D. 1861, June 7.—N° 1449.

COWPER, Edward Alfred.—(*Provisional protection only.*)— " Improvements in protecting ships of war and land batteries " from the effects of projectiles." " Portions of my improve- " ments relate to a means of causing shot and shell, or other " projectiles thrown by an enemy, to glance off from the surface " of iron or steel plates in a more certain and complete manner " than is commonly the case, by fixing a certain thickness of a " softer metal on the face of such iron or steel plates, which " metal shall practically act as a lubricator to reduce the friction " or adhesion between the projectile and the plates at the moment " of impact. It is well known that for very light machinery that " is subjected to only very slight strains, the thinnest oil is best, " whereas for very heavy machinery that has to bear extreme " pressure, the best lubricant is tallow or other viscous substance, " so for the enormous force or extremely severe pressure that " takes place when a heavy iron projectile strikes a thick iron

"plate, I use a much tougher, harder, or more viscous substance "such as lead, zinc, tin, copper, antimony, bismuth, or alloys "of these metals, and which being softer than iron, act as "lubricators thereto. I propose to call such plates 'lubricated "'armour plates.'"

"Other portions of my improvements relate to certain means "of causing a number of armour plates to assist each other in "their resistance when a projectile strikes any one of them, by "so connecting the edges of the plates that no plate can be "forced in below its neighbours, until a large amount of metal "has first been destroyed altogether in its form, or sheared in "two; this result I attain" "by boring holes of large diameter "through the plates exactly in the joints of the same when fixed "in place, so that half the hole is in one plate, and half in the "other, and in which holes I cut a strong coarse-threaded female "screw, and then screw into the same strong iron screw plugs, so "as entirely to fill the holes: thus it is impossible to move one "plate past the other without first shearing off or stripping the "thread of the screw." "I propose to call this system 'screw-"'locking armour plates.'"

[Printed, 4d. No Drawings.]

A.D. 1861, June 7.—N° 1452.

LANCASTER, Charles William.—"An improved method of "sheathing ships and vessels with copper and other metallic "sheathing." The invention consists in coating the parts to be sheathed with bitumen, asphalte, or other like bitumenous composition, or any cement or composition which will become adhesive, and adhere to metal, or metal and wood, on being heated or dissolved; "and in covering the inside of the copper or other "metallic sheathing with a similar coating;" "in placing the "coated side of the sheathing on the bitumenous coating on "the ship or vessel, and in the application of heat to the copper, "whereby the bitumen or bitumenous composition becomes adhe-"sive and cements the sheathing to the ship or vessel. I prefer, "before applying the coating to the ship, when of iron, to screw "in studs which project to any required extent. I make corre-"sponding holes in the copper or other sheathing which pass "over the studs; I then, by preference, apply a washer over the "heads of the studs and beat them out to convert them into

" rivets. The washers may be dispensed with, and other modes " of fastening by screws or bolts may be adopted in combination " with my bitumenous cement. In the case of wooden ships and " vessels, nails may be used as at present."

[Printed, 4d. No Drawings.]

A.D. 1861, June 12.—N° 1499. (* *)

WALKER, William Hammond.—" A floating hydraulic lift- " stage for raising navigable vessels or other heavy bodies above " the surface of the water, and an improved method of 'blocking' " or 'shoreing up.'"

This apparatus is thus described:—

"This my said invention consists in a peculiar construction of " double floating stages (as herein-after described), the two parts " being placed parallel to, and sufficiently apart from each other " to admit the vessel to be lifted to be floated in between them. " This double floating stage is connected together by transverse " beams or kelson girders, which are capable of being lowered " down to admit of the vessel or other body to float over them, " when they are lifted up with the vessel to be docked resting " thereon. I use a number of vertical hydraulic machines to " elevate the transverse beams upon which the vessel rests. Each " of the parts of the floating stage I construct of a number of " pontoons or vessels (say of ten each) placed parallel to each " other, and say about five feet apart. These pontoons I prefer to " construct of iron plates, and have a sufficient displacement con- " jointly to bear up at a certain draught of water the vessel or " other body to be lifted, together with the weight of the appa- " ratus itself and materials; and the pontoons of each stage I " connect together by two, three, or more beams or girders " extending horizontally across the top of the whole set of pon- " toons used to form the stage, and which I connect to transverse " beams in the sides of each pontoon, and which transverse beams " rest upon a horizontal girder stringer, which runs round the stage " a little below the top of the pontoons. The hydraulic lifts I " mount above the openings between the pontoons, and connect " them to the transverse iron girder beams, which connect the " two floating platforms or stages together by vertical rods or " chains, which work through the arms of crossheads on the " heads of the rams, where they are 'pauled' during the up " stroke, and the rods or chains are pauled on the deck during

" the down stroke of the rams to repeat the lift, or when the " rams are not in action. The transverse bridge girder beams " upon which the vessel or other body is lifted, I connect together " by other longitudinal girder beams, which are placed trans- " versely across them, the centre longitudinal beam forming the " keel blocks, space, and so forth, upon which the vessel rests."

' The keel blocks I make portable, and capable of being moved " in case of need when the vessel is on them. Bilge blocks I " also construct to work upon inclined planes, to be chocked " under water, and to grip the run and bilges of the vessel before " the strain comes on, to equalise not only the weight of the " vessel, but the amount of pressure on the cross beams."

" When the operation of lifting is to be accomplished, the " transverse beams and so forth being lowered down to the " requisite depth to allow the vessel to be floated between the " double pontoon stage, when the transverse stage upon which " the vessels rests is elevated by the various hydraulic lifts on the " decks or the floating stages. The hydraulic lifts are worked in " the usual way by a pair of small engines placed on each side of " the stage, or in any other convenient position. The lift of each " of the hydraulic rams I equalise by supplying them through " branch pipes from one common feed pipe, and the branch pipe " of each cylinder being provided with a suitable cut off valve, so " that one or any number of the lifts can be cut off at pleasure."

" The whole of this my improved floating graving dock is so " constructed, that it consists mainly of a combination of dupli- " cate parts, one pontoon, one hydraulic cylinder, and so forth, " representing a counterpart of the other like portions of the " machine, by which arrangement any of the parts can be " removed for painting or other repair, and be replaced by dupli- " cate parts provided for the purpose, without interfering with " the general working of the apparatus."

[Printed, 10*d*. Drawing.]

A.D. 1861, June 12.—N° 1508.

DREW, Joseph.—(*Provisional protection only.*)—" Improve- " ments in the adaptation of plates or shields to fixed and float- " ing batteries, and also ships, for the purpose of more effectually " resisting shot or other projectiles." The invention " consists " in adapting elastic material or springs of metal in combination

" with plates of metal or shields applied to the sides of ships,
" gun boats, or floating batteries; also to fixed batteries, fortifica-
" tions, and other places of defence, and is designed for more
" effectually resisting shot or other projectiles, and for dispensing
" with the necessity for employing very thick plates of metal as
" at present practised in constructions of similar character to
" those above mentioned."

[Printed, 4d. No Drawings.]

A.D. 1861, June 14.—N° 1527.

THOMAS, WILLIAM CAVE.—(*Provisional protection only.*)—
" Improvements in metal casing or armour for the defence of
" ships and batteries." These consist in "the use of laminated
" plates in the defence of ships and batteries, which I effect either
" by simple lamination, that is, by laminated plates of a single
" metal, such as iron, steel, copper, or lead, or by compound
" lamination, in which iron, steel, or copper plates will be alter-
" nated with leaden layers or strata, or with some flexible material,
" such as leather; or by diagonal lamination, simple and com-
" pound; in which the layers or strata of metal or material will
" be inclined to the longitudinal and vertical axes of ships and
" batteries, or by the application of lead to armour plates, or by
" the application of hexagonal concentric blocks, concentric to
" points within the ship or battery covered with a skin plate of
" metal. Or, by the application of hexagonal parallel metal
" blocks free to move within each other backed by sand or
" earth; or by any mere modification or modifications of the
" above."

[Printed, 4d. No Drawings.]

A.D. 1861, June 17.—N° 1545. (* *)

WHITE, DAVID BLAIR.—" Improvements in plummets and
" gauges for indicating the depth and the height or level of
" liquids."

This invention "is more particularly intended to indicate on
" shipboard the height or depth of water that may have leaked
" into or otherwise entered the hold, but it is applicable to indi-
" cating the depth and the height or level of liquids generally."

A wire from one pole of a galvanic battery "leads to a needle
" or series of needles or indicators, while communication is

" established to complete the electric circuit by means of a float, " or, in the case of salt water and other good conducting liquids, " by the water itself rising and coming in contact with one or " other of a set of metal plates placed one over another, and each " having connected to it a separate wire leading to the indicating " apparatus. The plates being at different levels, the indicating " apparatus shows which plate is in communication, and conse- " quently the height of the liquid; or two plates each connected " with a separate pole and placed close together with one indi- " cating needle may serve the greater or lesser depth of fluid " increasing or diminishing the acting surface of the plates, and " deflecting the needle accordingly."

In an arrangement for sounding, " a piston or ram influenced " by the pressure of the water acts upon plates connected with " the battery by the wires through the line, and gives indications " as in the before-mentioned."

One apparatus shown in the Drawings consists of a number of metal plates fixed to a wooden rod; another apparatus consists of a cylinder (containing insulated metal plates) in which a ram or piston is free to move.

[Printed, 10*d*. Drawing.]

A.D. 1861, June 24.—N° 1614.

MOORE, Robert.—(*Letters Patent void for want of final Specification.*)—" Improvements in the construction, steering, and pro- " pelling of ships and other floating bodies and appliances " adapted thereto." "The first part of my invention is for " constructing ships and other vessels, for which wholly or in " part I employ voluted plates, sheets, or strips of iron and other " suitable metal, or admixture of metal with other material of a " plain or uniform surface attached alone or in combination with " other voluted or flatted sheets or strips, or with bar or angle " iron with or without filling or lining pieces, or in combination " with cast iron, or with timber, and also with or without other " material, simple or compound, to maintain or increase the " cohesion, compactness, or solidity of the metallic substances, or " of all the component parts, or to prevent or diminish the result " of fracture in case of damage natural to any or several of " the substances if employed alone, which adaptation is partly " applicable to other purposes."

The invention consists, secondly, in the employment of two or more helical vanes placed in the forward or after cant body of the ship or other vessel, or in both, to act either as auxiliary to or in substitution and independent of a rudder.

3. " In the adaptation of one or more adjusting frames, moveable in a vertical direction at the stern of ships propelled by helical paddles or screws of any kind whatever, for the purpose of permitting the propeller to be driven by direct shafting, or by gearing with variable immersion irrespective of the ship's load line. For this purpose I use a stern post having a slotted opening cut for the vertical movement of the screw shaft, or rolled, or forged. or fashioned partially or otherwise with the parts rivetted, bolted, or otherwise fastened together, so as to admit of the desired movement; otherwise, I employ a stern post formed of one or more pieces, with two or more suitable openings for independent shafting, but in the latter case the adjusting frame is somewhat different in form and action from the preceding."

4. In "an improvement in pumps, applicable to other purposes."

[Printed, 4d. No Drawings.]

A.D. 1861, July 3.—N° 1691.

GILFOY, Charles.—(*Provisional protection only.*)—" Improved means of resisting and extinguishing fire in buildings or on board ship."

" The invention consists principally in fitting or constructing the rooms of buildings, and the cabins, holds, or other compartments of vessels, with water-tight or perforated ceilings, and providing such ceilings with pipes and union joints, to which the engine hose or pipes from the main or other water service may be connected, so that in the event of fire in any room or compartment, the ceiling above the same may be charged with water, and thus not only will the water be discharged through the perforated pipes or perforated ceiling directly on to the fire to extinguish the same, but the ceiling being charged with water will resist the fire, and prevent it from communicating with the stories or compartments above.

" The ceiling may be made of perforated zinc or other suitable material, and may be divided into compartments or otherwise, as preferred. Perforated pipes may also be used instead of the

" perforated ceiling or in connection therewith for distributing " the water. The union joints or connections for the hose or " service pipes may be placed outside the apartments, so that in, " the event of fire the hose or pipe may be attached and the fire " extinguished without opening doors or windows, removing " goods, or endangering life by exposure to the fire or smoke, or " the union joints or connections for the hose or service pipes " may be placed inside the apartments, if desired."

[Printed, 4d. No Drawings.]

A.D. 1861. July 5.—N° 1714.

ROUGHTON, Lewis.—" Improved apparatus for extinguishing " fires." This invention relates to " a novel arrangement of appa- " ratus whereby fires arising from accident or spontaneous com- " bustion, whether in warehouses or other fixed structures, or in " ships, may be successfully combated and brought under com- " mand, and that to a considerable extent during the absence of " firemen or other attendants." In applying the invention to ships, a system of distributing pipes is to be kept charged with water, during a fire, by force pumps. In the branch pipes of this system " I fit pendent valve boxes, which form vents for dis- " charging the water in jets " to the space below.

The valve boxes are made of cast iron or other metal, and have sockets for receiving the ends of the branch pipes which carry them. In each of these boxes is a hollow cylindrical valve, the body of which is plugged with a fusible compound, " which may " consist of the mixture known as fusible metal, or of a combin- " ation of wax, resin, stearine, or the like substances mixed in " such proportions as to melt, say, at a temperature not less than " 100° Fahrenheit. This valve is pierced with lateral openings, " and it beds by means of elastic packing on its seat, and is " capable of being lifted from its seat to allow of the discharge " of water from the box by a screw " " taking into a tapped socket " in the back of the valve, or by other equivalent contrivance " operated, say, from the floor above. The valve box is by pre- " ference formed with a closed mouthpiece," " which is pierced " with holes like the rose of a watering pot for discharging the " water in a shower or in fine jets. If, however, a fire occurs and " makes head without being noticed, or without access to the " valve boxes being admissible, the heat of the apartment in

" which it commences will melt the fusible compound in the " middle of the valve and cause a discharge of water precisely " similar to that which would follow the lifting of the valve, " which water if not sufficiently abundant to deluge the apart- " ment, would rapidly be converted into steam, and thus extin- " guish or greatly retard the progress of the fire."

[Printed, 6d. Drawing.]

A.D. 1861, July 18.—N° 1814.

ROGERS, JASPER WHEELER.—" An improved mode of building " ships and floating batteries, applicable also in part to the con- " struction of fortifications." " The object of this invention is so " to combine wood and iron in the building of ships and floating " batteries, and in the covering of fortifications as to render them " impervious to shot, and in the case of floating shot-proof " structures materially to increase their buoyancy."

The invention is based on the fact that " the resisting power " of iron plates and planking is enormously increased when the " same are set edgewise to receive the concussion, force or weight " against which they have to contend in place of presenting a flat " side to the strain. As an illustration of the mode of applying " iron and wood according to this principle of resistance to " the building of a ship of war, I may state that I commence with " the keel, making first a longitudinal iron core of plates of " wrought iron, cruciform in cross section. The plates are bolted " to angle iron fitted into the four angles of the cross and run- " ing from end to end of the core. The lower angles of the cross I " fill in with parallel plates of iron set up on edge, and alternated " by planks of wood, such as teak or oak. This filling I secure in " place by lateral screws and nuts. Upon this keel I build up " the hull of the vessel, forming it of lines of iron plates set edge- " wise, so that the breadth of the plates will give the thickness " of the hull, and alternated with planks of teak or oak. These " lines of plates and planks will take the varying curve of the " cross sections of the vessel, and extend from the keel to the " bulwarks, their inner ends filling the upper angles of the core " of the keel. The plates and planks are secured together in " groups by short screws passed through them, and also by the " nuts of long screw tie bolts, which are placed at various eleva- " tions, and run through the plates and planks, extending in a

" kind of break joint arrangement from stem to stern of the " vessel, so as to tie together all the parts that go to form the hull. " Across the ship and along the bottom and sides I arrange angle " iron girders, and secure them in position by eye bolts projecting " inwards from the longitudinal tie bolts before mentioned."

"The upper deck I construct on the same compound principle " as the hull, and continue it partly or wholly through the hull, " so as to make a strong bond strengthening the junction by " longitudinal angle iron girders. In a line with the keel I lay " a compound beam of wood and iron, and pass bolts through " the keel and through this beam, so that it forms virtually an " internal projection of the keel."

"This mode of constructing war vessels is also applicable to the " building of ships for commerce, batteries, and fortresses, the " arrangement of the walls and internal bracings " being adapted to suit different circumstances.

[Printed, 10*d*. Drawing.]

A.D. 1861, July 19.—N° 1825.

JOHNSON, JOHN HENRY.—(*A communication from Hippolyte Ulysse Petin and Jean Marie Gaudet.*)—" Improvements in the " manufacture of ships' armour plates and other heavy forgings, " and in the machinery or apparatus employed therein." According to this invention, it is proposed to employ a crane and peculiar gripping holders for the purpose of seizing the pile or faggot in the furnace, and of conveying the same to the rolls. As in large forgings it is necessary to heat the iron several times, and to turn it over or reverse it at each heat (an operation which entails in the ordinary system a vast amount of manual labour), it is here proposed to employ a peculiar apparatus for reversing or turning over the pile or faggot. This apparatus consists of a species of horizontal hinged tipping frame, upon which the pile or faggot is laid, and which is then elevated at one end by means of a chain and suitable windlass, until the frame assumes a vertical position, when by slightly continuing the motion of the free end of the frame, the pile or faggot carried by it is turned over into a suitable bed plate, or support. The pile or faggot, on being presented to the rolls, is carried by a jointed table provided with antifriction rollers, upon which the pile or faggot travels up to and through the rolls. By jointing this table, facility is afforded for

adjusting it in any position horizontally upon the floor, so as to receive the pile or faggot at the most convenient place, and present it at any desired horizontal angle to the rolls. A similar table may be placed on both sides of the rolls, and the pile or faggot passed to and fro through them, for which purpose a reversing motion, worked by a small steam cylinder, is employed for reversing the rolls as required. In preparing a pile or faggot intended for an armour plate or other similar forging, a rectangular rolled or hammered plate is used, upon which are piled a number of trapezoidal-shaped bars in two or more series, one above the other, but so as to break joint. Upon these bars is laid a second rectangular plate, having a series of strong ribs rolled or formed thereon; or in lieu of a plate, a series of ribbed bars may be laid side by side over the piled bars, and the faggot being now complete, is heated and welded, or rolled together, one of the rolls being grooved, in order to preserve the grooved or channelled surface of the plate on one side. This grooved face of the armour plate offers the advantages of increased strength and lightness over those made with plane or flat surfaces.

[Printed, 10*d*. Drawing.]

A.D. 1861, July 22.—N° 1841.

BEATTIE, Joseph.—" Improvements in arrangements in build-" ings and ships with a view to the extinguishment of accidental fire " therein, and also the ventilation thereof." The improvements consist of " arrangements of pipes or water passages for the con-" duction and diffusion of water through buildings or apartments " wherein a fire may happen to be. This is effected by a system of " pipes having outlets through which water may pass and be " scattered and diffused through the place or apartment," the force employed being steam or other available power.

" I also at other times force or partially exhaust air, by means " of a fan or other suitable apparatus worked by steam or other " power, through the main and branch pipes for the purpose of " ventilating."

[Printed, 2*s*. 6*d*. Drawings.]

A.D. 1861, July 26.—N° 1873.

BOURNE, John Frederick.—" Certain improvements in the " construction, armament, and equipment of batteries, floating or

" otherwise, for war purposes." The improvements consist firstly, in forming "the defensive sides of a floating or fixed " battery of three or more layers or thicknesses of iron plates, or " of plates, bars, and angle or T-iron. The outer layer consists " of armour plates, which may be either plain or convex on the " outer surface, and may be either square, oblong, triangular, or " of any other shape to suit the form of the battery. The central " layer consists of bars or plates of iron placed diagonally or " with their joints and edges crossing at an angle of forty-five " degrees (more or less) the joints and" "edges of the outer " and inner layers. If more than one central layer be used, the " layers may be crossed and recrossed with reference to each " other and to the outer plates. These diagonal or central plates " are bolted or rivetted to the inner plates. The inner series of " bars or plates I prefer to place vertically or at right angles with " the horizontal lines of the outer series of plates, that is to say, " in the position of ribs or timbers in a ship. This inner series, " may, however, consist of plates rivetted together in the ordi- " nary way and strengthened by T or angle iron. And the " diagonal plates may be bolted or rivetted to them either exter- " nally or internally, so that that which I describe as the inner " layer or series may become the central layer or series, and vice " versâ. But I prefer making the inner layer either of flanged " plates bolted or rivetted together in a vertical position the better to " 'break joint' with the other horizontal plates, or else of ribs of " T or angle iron, with plain vertical plates bolted or rivetted to " them."

" In building a floating battery, such as would be most suitable " for the protection of harbours, naval arsenals, and coasts, I " bend the vertical bars or ribs of angle or T-iron to the form of " an ellipse of which the greater diameter forms the breadth of " beam, and the lesser diameter the depth of the vessel, so as to " give very great stability." " The upper portion of the elliptic " ribs being plated over like the sides with diagonal band plates " and light armour plates, forms a housing over and protection " to the decks and crew from everything but the heaviest shot " from rifle guns at short ranges."

2. In placing " between the layers of plates thin sheets of india- " rubber, or sheets of any thickness of other elastic or slightly " yielding substances, as gutta-percha, or felt saturated with a " composition of india-rubber and other substances, or felt,

" paper, or pasteboard, which may be saturated or coated with " tar or other substances, in the usual way of rendering such " sheets impervious to water. Or I use asphalte mixed with " lime or with lime and sawdust, to form a water-tight bed for " each armour-plate. And when putting on the armour plates I " introduce between the edges of contiguous plates, ribbons, or " sheets of india-rubber or other before mentioned materials."

3. "In the mode by which armour plates are secured to the " defensive parts of a battery, whether such battery be of stone, " brick, wood, or iron."

" Instead of boring holes through the armour plates of batteries " for the introduction of bolts to secure the plates to their timber, " iron, or other bed, I weld the end of the bolt to the inner side " or to the edge of the plates or bars."

" They may be welded in any other manner, or may even be " made from a mould at the iron works without separate welding; " but I prefer, as by far the easiest method, to 'jump' the bolt on " to the plate at the welding heat, finishing off the welding by " inserting the bolt into a hole in a 'swage' block, and hammer- " ing the outer side thereupon, so as to perfect the joint and keep " the bolt in its exact position."

" To secure plates of great size and thickness, I prefer to fix " such plates without any bolts on or through them to the side " of the battery, alternately with long narrow bolt plates, *i.e.*, " plates or thick bars, having bolts welded to them, as above " described. The bolt plates in section are wider on their outer " surface than on the inner surface, and the large plates are the " reverse, viz., larger on the inner surface than on the outer, so " that a large plate, say 20 feet by 4 feet by 5 inches may be held " as in a dovetail between two bolt plates, say each 20 feet by 7 " inches by 7 inches, but convex on the outer surface."

4. In forming "the porthole of any battery in large circular " moulds or rings of wrought iron, one fitted to the outside of " the battery or vessel, and one inside, at suitable openings to be " left for the same in the armour and other plates. Each of " these rings is bored out with a concave dishing, or countersink " in such way that when bolted together in their places they serve " as a socket for the head or ball end of the carriage or traversing " platform hereafter described, on which the gun is mounted."

"The cheeks of the gun carriage or platform (for my improved " gun carriage is a combination of the two) are made chiefly of

" wrought-iron plates strengthened with angle iron." These " cheeks are fitted with horizontal slides, one pair to each cheek, " similar to those for the piston rod of a locomotive engine, but " curving down in the rear."

" The trunnions of the gun are fitted with slide blocks to run " easily in these sides, and a sling of wrought iron, also fitted with " slide blocks on its trunnions is fixed in any convenient way to " the base ring, cascable, or button of the gun. This sling sup- " ports the breech and carries the gun in a position parallel with " the slides when the gun is run forward, and gives the muzzle " a slight elevation when the breech slide blocks run down the " curve of the slides in the recoil." "These cheeks of the " carriage or platform are brought together in front (being " hammered when hot in a 'swage block' accurately shaped for " the purpose) their inner sides forming a cylindrical or conical " opening, through which the muzzle of gun (the swell being " turned off so as to lessen the opening) can run and slightly " protrude. The outer sides of the cheeks in front are hooped " together by a large brass or iron ring driven or shrunk on, and " turned externally with such convexity as to fit the hollow " socket or circular porthole already described. This ball and " socket joint thus forms a front pivot for the platform and gun, " both in their horizontal and vertical movements." In this plan the gun slides freely parallel with and between the cheeks of the platform, which is itself elevated or depressed in the rear on a front pivot, and a carriage supports the rear of the platform, and traverses on racers, having their imaginary pivots or radial centres in the muzzle of the gun when run out. "To the exterior of " the porthole I fix with a strong hinge a circular iron port, plug, " or stopper. The upper part of its inner surface has a projecting " piece, against which the gun presses when it is run out, causing " this port to open. When the gun recoils the port falls shut."

" Whenever a breech-loading gun, not requiring recoil, may be " used, I then cast or otherwise superfix a portion of a large ball " round the muzzle or second reinforce of the gun itself, which " ball works in the concave porthole as described."

5. The porthole being entirely closed (by an iron port when the gun has recoiled, and by the muzzle of the gun when it is run out) " I lay the gun by means of sight and guide rods, with an " appropriate sight hole in the face of the battery."

6. In using "elastic ropes of india-rubber properly prepared,

" or of india-rubber laid over or otherwise combined with spiral
" springs, as breech and preventer ropes to the guns, in such way
" that being extended by the recoil of the gun, they may run it
" up again when loaded."

7. In constructing "an iron-plated floating battery by strip-
" ping the external planking from any strongly built wooden ship
" of war to a line, say about five feet below the water line. In
" the upper edge of the planking then left I cut a rebate square
" or bevelled or a groove sufficiently large to receive the ends of
" diagonal iron bars or plates, the said ends and rebate being
" covered with india-rubber ribbon or sheeting as a caulking, and
" to protect the planking from contact with iron. The diagonal
" bars or plates having their lower ends inserted in the groove or
" rebate are then bolted to the timbers diagonally over the whole
" side or as far as it is thought necessary to fix on the armour
" plates.

" In putting the copper sheeting on to the planking of the
" ship's bottom, the upper half sheets of the upper tier of sheets"
are "passed over the front edge of the rebate and up the outer
" side of the lower ends of the diagonal plates. The lower tier of
" armour plates is then put on over the half sheet of copper,
" always with the elastic sheeting or caulking between iron and
" copper or iron and plank. The lower edge of the armour plate
" may be levelled or formed with a rebate, if necessary, to fit
" over the coppered planking, and insure a good and tight joint.
" The bolts of the armour plates are passed through the diagonal
" plates to ceiling bars of ℶ or double angle iron placed hori-
" zontally inside the timbers, inside of which ceiling bars they
" are secured by nuts. The two sides of the floating battery are
" tied together by strong iron tie rods aud bulkheads formed of
" iron plates."

[Printed, 6d. No Drawings.]

A.D. 1861, July 27.—N° 1882.

HARFIELD, William Horatio.—" Improvements in con-
" structing and propelling ships and vessels." "For these
" purposes, in order to use a paddle wheel in the centre line
" of a ship or vessel, and to work in a close case in water,
" the surface of which is at a lower level than the surface of that
" in which *the vessel floats*, the bottom of the ship or vessel is to

" be built with a hollow groove or inverted trough from end to " end thereof. The sides of such inverted trough or groove are " preferred to be upright and parallel, and of a depth somewhat " less than to the water level in the paddle-wheel case. This " inverted trough is constructed with suitable metal framing and " plated with metal plates, in like manner to that in which iron " ships or vessels are now built. On each side of this inverted " trough or groove a keel may be formed. Intermediate of the " length of this inverted trough or groove is constructed an air " and water-tight chamber of suitable dimensions for receiving the " paddle wheel. This air-tight chamber is open at bottom and " closed at top, there being, however, a man-hole capable of being " closed air-tight at the top, in order to admit of persons getting, " when necessary, into the paddle-wheel case or chamber. This " paddle-wheel chamber or case is constructed with metal framing, " and plated over in like manner to that practised in building " iron ships or vessels. By thus constructing a ship or vessel " with a hollow groove or inverted trough of metal along the " bottom, and a chamber for the paddle wheel of metal, great " strength in the construction of a ship or vessel may be obtained. " The paddle-wheel shaft turns in bearings supported at the sides " of the chamber or case, and the shaft or axis passes through " stuffing boxes into the interior of the ship or vessel in order " that the air in the chamber may not escape, and that when the " water is allowed to rise in the paddle-wheel case to a level cor- " responding with the line of floatation of the ship or vessel, the " water may not pass into the ship or vessel, as in many cases the " paddle shaft will be below the level of the exterior water. The " paddle wheel used has feathering floats or paddles. When at " work, the air in the paddle-wheel case or chamber is to be under " compression in such manner that the water may only be per- " mitted to rise into the chamber or case to such an extent as is " most favourable for the action of the float boards or paddles; " for which purpose an air pump is applied, which being worked " occasionally, will keep the water within the paddle-wheel case " at the desired height.

[Printed, 10d. Drawing.]

A.D. 1861, July 30.—N° 1900.

PARKES, ALEXANDER.—(*Provisional protection only*).—" Im- " provements in the manufacture of sheathing metal for ships

" and vessels." "This invention has for its object improve-" ments in the manufacture of sheathing metal for ships aud" vessels, and consists in combining a very small per-centage of" tin or aluminium with sheathing metal composed of copper and" zinc. The proportions of the copper and zinc may be some-" what varied, but it is preferred that the compound should roll" hot, and that the proportions should range between fifty parts" of the best and purest copper which can be procured, to fifty" of the best and purest zinc, and sixty of copper to forty of zinc," and to such proportions I add from a half per cent. to two" per cent. of pure tin, or in place thereof from a half per cent. to" two per cent. of aluminium."

[Printed, 4*d*. No Drawings.]

A.D. 1861, August 5.—N°. 1938.

BURN, CHARLES.—(*Provisional protection only*).—"Improve-" ments in the mode of fastening iron armour plates to ships'" sides." These improvements consist in securing or fastening iron" armour plates at the horizontal joints in the following" manner:—A bolt hole tapering inwards, that is, smaller at the" inside of the plate than the outside, is made to extend equally" from the joint into each plate; an iron plug, tapered in like" manner, is made to fit this bolt hole, and a bolt made of wire or" wire rope, endless or otherwise, passes round the same, thence" through the side of the ship, and is secured inside by a key or" wedge, by which it may also be tightened. In order that the" plug may fit the bolt hole, and bear evenly on the plates, a" groove is made therein for the reception of the wire bolt or" rope. The wire bolt may also be tightened in the following" manner:—Let the inside extremity pass through a socket or" thick tube, which screws in a nut bearing against the ship's" side, and a key or wedge bearing against the socket or thick" tube to hold the wire bolt or rope, by turning the nut the wire" bolt may be tightened as easily as an ordinary bolt. As an" additional support to the plates, they may be supported by" horizontal lines of T-iron fastened to the side of the ship at the" joints, suitable provision being made in the plates to bed or" rest on the same."

[Printed, 4*d*. No Drawings.]

A.D. 1861, August 6.—N° 1954.

COWPER, Edward Alfred.—(*Provisional protection only*).—"Improvements in protecting ships of war and land batteries "from the effects of projectiles." This invention is the same as No. 1449 of 1861, with the addition of an improvement in forming "armour plates of malleable cast iron of great thickness."

[Printed, 4d. No Drawings.]

A.D. 1861, August 8.—N° 1975.

BOVILL, George Hinton.—"Improvements in ships of war "and other vessels, and in the manufacture of armour and other "plates of wrought iron." The improvements consist, firstly, in the application of vulcanised india-rubber, that shall be permanently elastic, to the seams of the planks and decks of ships. The ordinary caulking of oakum may be driven into the seams in addition to this india-rubber packing, if desired. The packing will be found to give and take to the working of the ship, and will always maintain the seams water-tight.

"Secondly, in order to prevent adhesion to the bottoms of "ships, I apply magnetic or galvanic electricity in such manner "as to produce electric currents through the metal plates forming "or sheathing a ship's bottom. For this purpose one of the "poles of galvanic batteries or other apparatus, by preference the "positive poles, are attached to the plates at different parts of "the ship, and the electric circuit is made through the plates "into the water. The negative poles of the batteries are carried "into the water, and attached to plates as collectors, and insu- "lated from the plates or metal of the ship's bottom, to which "the positive poles are connected. The electric circuit will thus "be kept up from the positive to the negative pole plates. By "thus applying electric currents, the fouling, corrosion, and the "adhesion of barnacles and living insects will in the case of iron "ships be prevented, and in coppered ships the waste of copper "will be diminished."

Thirdly, in propelling and manœuvring ships by forcing out water, the pipes or apertures used "are to be formed or placed as "far below the surface of the water as practicable; the area of "these apertures is not to be less than 13 superficial inches for

"every horse power employed, and where practicable, the apertures and conduit pipes leading thereto from the propelling pumps should be so large that the velocity of the current of water passing through them should be about 20 per cent. greater than the speed of the vessel. With the before mentioned conduit pipes and apertures are combined centrifugal pumps, so as to cause a continuous stream of water to be kept up and discharged against the water opposed to it at the stern of the ship or vessel." "In order to manœuvre and steer vessels (having other propelling machinery,) I prefer to have on either side of the ship a discharge pipe from a centrifugal pump worked either by an auxiliary or the main engines, with a simple arrangement for reversing the action of these pipes, either to make them the inlet or outlet pipes according to the direction in which it is desired to steer or manœuvre the ship."

"Fourthly, in arming ships of war, what may be called telescopic martello towers are used, which are constructed, by preference, of a cylindrical form and of wrought iron plates of sufficient thickness to be shot-proof; these shot-proof cylinders should be from 6 feet to 9 feet diameter or more. On the top is placed a turntable, carrying an Armstrong or other powerful gun; this turntable and gun are housed in, and suitably protected with angular shot-proof plates, an opening being left in the top to relieve the concussion of the air, and to clear the smoke produced when firing the gun. The length of the cylinder will depend on the depth of the ship; in a large vessel it may be made to rise from 25 to 30 feet for action, but when not in close action, this telescopic martello tower will be housed or lowered down, but so that the gun thereon could still be worked clear of the bulwarks as a pivot gun. The tower and gun will be raised up by hydraulic power or other mechanical contrivance worked by the auxiliary engine."

"Fifthly, in order, when applying armour or thick plates to the sides of a ship or vessel, to utilize the strength of the iron thus added, and to give strength to the ship, instead of the armour plates being fixed or hung to the outer skin of the vessel, as heretofore practised." "I use armour plates with flanges formed or rolled at two opposite edges, leaving the two ends or other opposite edges without flanges; these flanges are put together and connected, when bolts or rivets are used, in a similar

"manner to that in which the flanges of cast-iron tank plates "are connected, but I prefer to weld the flanges of the plates "when set up in position in a similar way to that in which large "deck beams are welded by means of a probable forge or "furnace." "This mode of applying armour plates to iron-"built ships," "is also very suitable for ordinary wood built ships "of war, which may be covered external of the planking with "flanged armour plates put together as above-described, with "bolts or rivets, and such ships, in place of being weakened by "the application of armour plates, will be greatly strengthened." "In constructing ordinary iron vessels with plates flanged on "two opposite sides, I form the flanges sufficiently deep to give "such lateral strength and stiffness as enables the number of "ribs or frames to be greatly reduced." "I form decks of vessels "as well as of ships of war, with the plates flanged on the two "sides; the flanges may be formed as deep and as thick as "required, so that when welded or bolted together, the flanges "form the deck beams of proper strength, and the plates form a "continuous tie fore and aft of the ship as well as transversely." "In ships of war these iron deck plates may be made of sufficient "thickness to be shot proof."

"Lastly, in order to roll plates of iron or steel with suitable "flanges or right-angle bends along two opposite sides of each "plate, I employ rolls of a suitable form to produce a section "somewhat resembling the letter W," and "when such section "of iron or steel has been formed, the plate is passed between "flattening rolls to flatten the middle bend or curve, and this "flattening of the middle of the plate brings the edges or flanges "up to the required angle. By these means plates flanged on "two sides may be made with facility, either of moderate thick-"ness or sufficiently thick to be suitable for armour plates."

[Printed, 1s. Drawing.]

A.D. 1861, August 10.—N° 1999.

WIGZELL, MONTAGUE.—"Improvements in machinery or "apparatus for making plain twisted nails, spiral fluted nails, "and other similar driving articles of a twisted or spiral fluted "form throughout or in part." The invention consists of "a "machine or apparatus for making twisted nails and other simi-"lar driving articles of a twisted or spiral fluted form throughout

" or in part, either parallel or tapered, and of a plain, fluted, " grooved, or indented section throughout or in part.

" The machine or apparatus is capable of making one or more " nails at any number of revolutions or parts of a revolution of " its driving gear, and when the bars, rods, strips, or wire of iron " steel, brass, copper, or other metal or metallic alloy, are placed " in the machine they are drawn into their required position be- " tween the grippers at intervals by machinery or by hand, then " gripped and cut off into the required lengths, and held by jaws " which are placed over the ends of traversing and rotating man- " drils, then headed by hammers or press rods and twisted by the " traversing and revolving mandrils, which draw the pieces of " iron when cut as herein described through rollers in front of " the grippers, so as to give them the required number of twists. " The nails when thus made drop out of the jaws which open " when the mandrils have travelled their full distances."

The machine is constructed as follows :—" A driving shaft is " arranged on a suitable framework or bed, and is driven by " driving gear, to which motion can be given by any known " motive power; from the said driving shaft, by means of cambs " or cranks the mandrils are made to travel to and from the " grippers, and upon the ends of the mandrils are self-acting jaws " which hold the nails and form dies for the heads of the nails, " and in the centre of the mandrils are press rods, around which " the mandrils are made to rotate by means of friction rollers, re- " volving cambs, or conical clutches, upon a shaft to which " motion is given by the driving shaft. The grippers are worked " by a camb fixed on the shaft which rotates the friction rollers, " and the feeding apparatus composed of revolving cambs and " rollers is geared by wheels and worked by the said shaft, the " whole being arranged on requisite bearings and frame or bed."

[Printed, 10*d*. Drawings.]

A.D. 1861, August 14.—N° 2018.

COX, Nathaniel.—(*Provisional protection only*.)—" Improve- " ments in the construction of iron ships, the said improvements " relating to the method of attaching or securing bulkheads to " the frames or ribs thereof." In order " to strengthen the frame " and shell of the ship where the bulkheads are fixed, I propose to " add two, three, or four additional frames placed in front of the

" others, and rivetted to them, so that the frame forms as it were " a vertical hollow beam, one side removed; to these compound " frames I affix plates in a similar way to those forming the sheath- " ing on the outside; the side of the ship at that part will now be a " hollow box of great strength; to the inner plates I fix another " angle frame or rib, and to this in the usual way I rivet the " bulkhead."

[Printed, 4d. No Drawings.]

A.D. 1861, August 19.—N° 2055.

ROBB, John.—(*Provisional protection only*).—" Improvements " in ventilating." This invention consists of " a simple and in- " expensive mode of ventilating churches, dwelling houses, and " other buildings, ships, railway and other carriages, and other " places requiring ventilation. The principle adopted is that of " admitting the necessary supply of fresh air at a low level and " carrying off the heated and vitiated air at a higher level, a con- " tinuous movement of the atmosphere being kept up, while at " the same time all disagreeable or hurtful effects from draught " are obviated by the peculiar arrangements which are adopted " for that purpose. In ordinary cases the method employed is " to provide an opening at the bottom of the windows for the " ingress of the fresh air, and a similar opening at the top or " upper part of the windows for the escape of the heated and " vitiated air, such openings being covered with perforated card, " paper, gauze, cloth, or other perforated material. A continual " supply of fresh air is thus admitted into the apartment or other " place to be ventilated, but the current of air being divided into " minute streams by the perforations of the card, paper, or other " material, all unpleasant effects of draught ars prevented. The " heated and vitiated air is as rapidly and continuously carried " off through the upper openings.

" When perforated card, paper, or gauze cloth is employed, it " should be rendered waterproof by means of a coating of varnish, " paint, or in some other suitable manner."

[Printed, 4d. No Drawings.]

A.D. 1861, August 20.—N° 2076.

MUNTZ, George Frederick.—" Improvements in sheathing " iron ships or vessels." The " invention consists in sheathing

" iron ships with copper or 'Muntz's metal,' or other suitable " compound metal, so as to insulate such copper or metal electri- " cally by employing fastenings made of non-conducting " material, for which purpose I prefer nails or plugs made of a " compound of india-rubber known as vulcanite or ebonite, and " I place between the metallic sheets and the iron ship," " sheets of " india-rubber, or other sheets of non-conducting material; these " may either be attached to the metallic sheets by 'Daft's patent " 'process,' or held in place by merely driving through them the " nails or plugs which are used to attach the metallic sheets to " the ship."

" Plugs or nails made entirely of ebonite may be used, but I " prefer" each such plug having a small hole in the centre, into which a short metal nail will drive tightly, and " I prefer these " plugs to stand about $\frac{1}{32}$nd part of an inch above the surface of the " iron plate when driven home; I then place the non-conducting " sheet" " and a sheet of copper or metal drilled (either attached " previously to each other or otherwise) against the ship, taking " care to put the metallic sheet outside or farthest from the iron; " I then proceed to drive short nails through the two sheets into " the plugs of ebonite or other suitable material, always minding " to use nails with very little taper and with rounded points," " and particularly observing to have such nails shorter than the " ebonite plugs, so that they may not on any account come in " contact with the iron in the ship."

[Printed, 4d. No Drawings.]

A.D. 1861, August 21.—Nº 2092.

GRAHAME, Thomas.—" Improvements in the construction of " boats, rafts, and other floating structures." " The floating or " under portion of these boats or rafts is to be formed in two, " three, or more longitudinal sections, say, ribbed troughs of " iron, or any suitable material, placed alongside and apart from " each other, and fitted to receive and be firmly attached to and " support a deck or floor projecting beyond the outside lines of " these troughs of a strength sufficient to support the cabins or " coverings necessary for the protection of the passengers and " cargo, and to protect these floating troughs from the effect of " concussions at wharfs or in passing other floating bodies. The " troughs to be formed at stem and stern on the angle of exit

" and entry best fitted for progression through the water on " which they are to navigate, and of a strength sufficient fully to " resist the pressure to which they must be subjected when sub- " merged by the weight of a full cargo placed on the deck or " carrying platform of which they form the support, and in " farther security these troughs are to be divided from stem to " stern crossways or longitudinally into such a number of water- " tight divisions as to make submersion without an almost total " destruction of the troughs themselves almost impossible. " Floating bodies so formed are specially adapted for the applica- " tion of steam power, particularly the screw. The screw or " screws may be worked, when the depth of water so permits, " directly under the floating body to be propelled, and in almost " direct contact with the engine, and in the best or most suitable " position to ensure progression; or they may be worked in part " or wholly in the tunnels separating the bearing troughs."

The advantages of this system are an increased buoyancy and steadiness in the water; a reduction of weight of materials necessary for their construction; and of the " space sacrificed at stem " and stern in order to obtain the form best suited to pass through " the water, assuring to the passengers conveyed, and the cargo " carried on such floating bodies, when passing along canals or " rivers, a perfect and in other circumstances a greatly increased " security against the risks and damage of submersion, and " affording to such passengers and cargo a greatly increased " breadth of accommodation."

[Printed, 4d. No Drawings.]

A.D. 1861, August 22.—N° 2102.

BAINES, WILLIAM.—" Improvements in the construction of " girders, frames, or other apparatus, fixed or moveable, and for " certain peculiar forms or sections of iron used therein." By these improvements in the forms or sections of plates used in the construction of frames or compound girders, one part of each is male and another part female. " By bringing these parts together " they become inserted, and being secured by bolts or rivets, effect " a vertical union and continuous bearing, branching, or extend- " ing where required."

Also, " in constructing the moveable parts of railway turntables " I bend and form the plates into suitable parts or segments, and

" secure them in their respective places by bolts or rivets, thus " constituting one entire frame, forming its necessary cross " girders, which can be produced to suit any angle for any " number of roads upon the table."

[Printed, 10d. Drawing.]

A.D. 1861, August 26.—N° 2119.

MENNONS, MARC ANTOINE FRANÇOIS.—(*A communication from Pierre Louis Timothée Thier.*—" Improvements in the pro- " pulsion and steerage of ships or vessels, and in the construction " and arrangement of the machinery connected therewith." The invention consists in " certain improved combinations of known " mechanical elements applied to the propulsion of ships or " vessels with a view to obtain increased speed at a lesser expen- " diture of motive power, while affording greater facilities in " steering than those offered by any of the analogous arrange- " ments at present known. The large majority of propellers now " in use carry forward the vessel in throwing the water backwards, " in which process two resistances are encountered, the first from " the heaving or gathering of the water ahead of the ship, and " the second from the depression of the level astern; independent " of this, the propellers most commonly employed, such as the " screw and the paddle, expend a large proportion of their power " in agitating, without utility, a considerable mass of water, " while their movement gives rise to a decomposition of forces " which, to a great extent, paralyses their action and limits the " speed of the vessel to which they are applied. To obtain a " rapid and economical propulsion the main points to be avoided, " therefore, are useless agitation of the water, decomposition of " the forces, false direction of the power, gathering of the water " ahead of the ship, and lowering of its level astern. These " obstacles overcome, constitute an equivalent gain in favour of " the propulsion without throwing extra work on the motor; " the result of which is, that the entire force developed being " usefully opposed to the resistance encountered, the propulsion " must naturally become more rapid and more economical than " that obtained by the ordinary propellers as at present generally " employed."

The invention may be applied by means of paddles, pistons, screw turbines, or screws. According to the paddle arrangement

an opening is formed on each side of the bow of the vessel, merging into a canal formed above the keel, and placing the bow in direct communication with the stern. The water penetrates into this canal up to the height of the pallets, which are carried by a chain surrounding two wheels, situated one immediately before the other, in the after part of the canal. These wheels, worked by the action of the motor, carry round the pallets, which throw sternwards the water coming from the fore part of the ship, thus dissipating the gathering ahead and filling up the depression astern. It is essential to have the after opening of the canal of sufficient height to avoid obstructing the water thrown aft by the paddles; but in order to prevent the passage of the waves through this opening a strong valve is suspended from its upper section.

The rudder is mounted on a vertical shaft standing at the middle of the after opening of the canal. It has two blades, one of them projecting beyond the extremity of the keel and the other entering the canal. This rudder is intended to produce by its after blade the ordinary steering action, while the foremost one "narrows the canal to the right or to the left, and the water, "having no longer an issue in front, flows to one side and facili- "tates the veering of the ship."

The piston and the screw turbine arrangements described pump the water along the canal, and thus propel the ship. Either of these means may be adapted to vessels already built without alteration to their general form. To effect this application the canal is bifurcated at the stern instead of having a single issue at the middle of the stern. In this case an ordinary rudder may be employed, or a steering apparatus, with an excentric shaft, may be mounted within the canal at the point of bifurcation, so as to close, in its movement, one or other of the orifices, "thus causing "the water to flow through a single passage, and the vessel, as a "natural consequence, to veer with rapidity." On the same principle, a pair of rudders may be adopted, one in each branch of the canal, so set as to close at will one or other of the issues.

The object of the fourth or screw arrangement is "to economise "in favour of the propulsion the surplus force at present need- "lessly expended by the ordinary screw, as the water, instead of "being agitated and thrown aside by the pitch of the wings and "the centrifugal action, is so maintained and guided by" "a "hollow truncated cone, in which the screw revolves," "as to be "entirely projected in a line parallel to the axis of the vessel, and

" consequently in the direction most favourable to a rapid and " economical movement." It is proposed to employ sometimes a series of such screws all fed by the same canal.

In this arrangement the rudders are formed and worked in the manner already described for the other propellers.

[Printed, 1s. 6d. Drawings.]

A.D. 1861, August 26.—N° 2125.

FIELD, JOHN LYON.—" Improvements in the construction of " armour plates, and in their application to ships and batteries." " In constructing armour plates I roll or form them with ribs or " projections at the back surfaces in such manner that the ribs or " projections may be the means, when used with suitable bolts or " fastenings of fixing the armour plates to ships or batteries, " thus avoiding the use of holes through the armour plates for " the passage of bolts through them, and through the sides of the " ships or batteries."

" In fixing the armour plates to a ship or battery it is preferred " to employ bolts, the inner ends of which are tapped with screw " threads to receive screw nuts, the outer ends of such bolts being " made forked, so that the ribs or projections formed or fixed " at the back surfaces of the armour plates may be received " between the forks, and fixed thereto by rivets or other fasten- " ings passed through the ribs or projections, and the forks of " the bolts; or the bolts or instruments used for fixing the armour " plates when having ribs or projections at their back surfaces " may be otherwise formed."

[Printed, 10d. Drawing.]

A.D. 1861, September 5.—N° 2216.

NAPIER, JOHN.—(*Provisional protection only.*)—" Improvements " in the manufacture of armour plates for the protection of vessels " of war, floating or other batteries." " This invention has for " its object the manufacture of armour plates for the protection " of vessels of war, floating or other batteries, by means of direct " pressure, instead of the usual mode of making them under the " hammer or by rolling."

By the means employed " I am able to produce either plain " armour plates, as at present used, or plates with flanges or pro-

" jections or thickened up pieces on either side and on any part " of their surface. Armour plates so made may be bolted " together round their edges in the same manner as a cast-iron " tank is generally made. Or I forge thicker parts here and there " on the armour plate, and bolts are tapped into these thicker " parts for fastening on the plates, so that the strength would be " little or no less at the tapped part than at the other parts. Or " projections similar to short bolts or studs may be so formed on " the inside surface of the plate, which are screwed and fitted " with nuts, thus forming the bolts for fastening the plate to the " skin of the vessel where there is little or no wood or other " backing. Or where there is backing, this short stud may be " made of a little larger size, so that a hole tapped in its centre for " receiving the screw bolt from inside for fastening on the plate " will not pass beyond the ordinary surface of the plate, and " consequently will not weaken it in the slightest degree."

[Printed, 4d. No Drawings.]

A.D. 1861, September 5.—N° 2220.

GREENWOOD, Thomas.—" Improvements in machinery for " sawing wood." The object of this invention " is to facilitate the " cutting of straight, curvilinear, and other bevilled forms by " means of band saws. This I propose to effect by making the " inclination of the saw band adjustable to the work while the " action of sawing is proceeding."

The main element of novelty consists in mounting the tension pulleys, which carry the band saw, upon an adjustable or rocking frame, which by moving around a point cut by the operating edge of the saw, will allow of the adjustment of the saw while the machine is in action.

Secured to the bed plate of the machine are two standards, carrying the table of the machine; these standards are furnished with bearings for receiving the cranked trunnion supports of a rocking frame. This frame is of a segmental form, and furnished with rack teeth on its outer edge, into which gears a worm wheel for imparting, when desired, an axial motion thereto. Upon this frame is mounted a pair of tension pulleys, which carry the saw band. The upper pulley is mounted in adjustable bearings for the purpose of ensuring the maintenance of the saw at a proper tension, and the shaft of the lower pulley is carried by pendent

brackets of the rocking frame. The worm is mounted on a vertical shaft supported in a hollow standard attached to the bed plate of the machine. Keyed to the lower end of the worm shaft is a bevilled pinion, into which a bevilled pinion on a short horizontal shaft gears. The opposite end of the horizontal shaft is fitted with a bevil wheel, which gears into and is driven by a pinion on a cross shaft, carrying at its opposite end a bevil wheel in gear with a pair of pinions; these pinions are supported by a horizontal driving shaft which has its bearings in short standards bolted to the bed plates. To this shaft one of the above-named pinions is keyed, and also one of the pullies of a set of band pullies. The other pinion is keyed to a hollow shaft on the horizontal driving shaft, and to it is also keyed one of the pullies. The other pulley is loose on the shaft. This arrangement is for the purpose of driving the worm wheel in either direction at pleasure. It is also important that the speed of the worm (which causes the rocking of the band saw frame) should be capable of easy adjustment relatively to the speed of the sawing operation. It is proposed therefore, to transmit motion to the driving shaft through a friction gear arrangement, the speed given off by which may be determined by the adjustment of a hand lever. It consists of a feathered horizontal shaft to which band pullies are keyed. Mounted loosely on this shaft is a friction roller, which is embraced by a forked guide; this guide is free to slide on a fixed guide rod, carried by standards, which also afford bearings for the feathered shaft. Jointed to a lug on the under side of this fork guide is a rod which connects the guide with a crank arm on the outer end of a rock shaft; this rock shaft at its inner end carries a hand lever which works in front of a fixed quadrant, and a pin on the hand lever dropping into the notches formed on this quadrant, retains it in any desired position. The friction roller works upon the face of a vertical disc keyed to a horizontal shaft, to which a belt pulley is keyed, and a strap proceeding from this pulley to the band pullies transmits the requisite motion for rocking the saw frame.

Band saws constructed as above described are peculiarly applicable to cutting out the ribs or timbers for ships and for other purposes where irregularly curved or bevilled forms or shapes are required. For ensuring great exactness in the angle of the bevil, it may be desirable to graduate the segment frame, and provide a

fixed pointer, which will facilitate the reading off of the angles at which the machine is from time to time set.

[Printed, 10*d*. Drawing.]

A.D. 1861, September 9.—N° 2246.

SIMONS, WILLIAM.—"Improvements in constructing ships "or vessels." These improvements are seventeen in number; sixteen of them are described in No. 782 of 1861. The additional one introduced between numbers six and seven there described, and numbered seven in this specification, is as follows:—"The "constructing and placing of side paddle wheels so that their "floats shall draw more water than the vessel or project down "several inches or feet below the line of the vessel's bottom or "keel." "Also the making of metal paddle floats with flanges "or ribs upon their acting face, or with a thwart ship curve, or of "such a shape as to present a zig-zag section, that is, having "angulated or circular corrugations."

[Printed, 3*s*. 2*d*. Drawings.

A.D. 1861, September 16.—N° 2304.

MERITON, THOMAS.—"Improvements in steering apparatus." The improvements consist in the application of a brake to the various descriptions of steering contrivances that are now in use or may hereafter be constructed, as well as in the construction of the brake itself, which is so arranged as to admit of being worked from both sides of the barrel or steering apparatus.

In the immediate reach of the steersman, at each side of the wheel, is a lever, which by a mechanical arrangement of cranks (in such manner that both levers at opposite sides act simultaneously) effects the braking of the barrel which contains the chain working the rudders. This is done by means of a strap passing round a drum; the strap having upon its under surface, where it comes in contact with the drum, stops of wood or other suitable material for the purpose of causing great friction. One end of the strap is fixed to a pin or stud, the other is attached to the ends of the two cranks at their point of junction.

[Printed, 8*d*. Drawing.]

A.D. 1861, September 17.—N°. 2315.

WRIGLEY, FRANCIS. — "Improvements in the construction, "manufacture, and mode of securing armour for the protection "of ships and fortifications against projectiles." The "improve-"ments in the construction of armour consist in making it of "metal distributed in the cellular form, and in filling the cells "with wood or other suitable material or compound material "possessing similar properties of elasticity. I prefer to distribute "the metal so as to form upon a plate a connected series of "hexagonal spaces or cells, the metal forming the divisions "between the spaces or cells.

"I manufactured my improved cellular armour plates from "metal having the qualities of soft homogeneous wrought iron, "which is obtained by means of 'Bessemer's' process, forming "the said armour plates by pouring the molten metal into "suitable moulds and afterwards annealing them, if required.

"I secure the cellular armour to the sides of the ship or "fortification by fixing thereto ribs of iron of the T or other "shaped section, between which the armour plates are introduced, "the flanges of the ribs thus holding the said cellular armour "plates in their places without bolts or other fastenings."

"I prefer to have a lining of timber of sufficient thickness "between the cellular armour plates and the side of the ship or "fortification which they have to protect."

[Printed, 10d. Drawing.]

A.D. 1861, September 18.—N°. 2324.

BRIGGS, JOSEPH GIRTON.—(*Provisional protection only.*)— "An improved method of making fire-proof buildings, ships, "and other constructions." This invention "consists in making "fire-proof buildings, ships, and other constructions, and prevent-"ing the spread of fire by opposing to its progress water placed "either between walls, floors, and ceilings, doors or partitions of "any kind, or within walls, floors, ceilings, doors, or partitions "of any kind built or constructed hollow or held in or by any "convenient casing, or by any other means, against or upon the "surfaces of walls, floors, ceilings, doors, or partitions of any "kind, or any surface it may be desirable to protect from the "action of fire, providing for the free egress of steam, or for its "discharge upon the fire by means of a pipe, vent, or opening,

" or pipes, vents, or openings, or all or any of them, or by any " other means, and for the replacement of evaporated water by " means of a pipe or pipes fed in any convenient manner, or by " any other means."

[Printed, 4d. No Drawings.]

A.D. 1861, September 19.—Nº 2337.

EDDY, CHARLES WALTER.—(*Provisional protection only.*)—" A " new method of arming the bow of a ship of war with a shell " and a beak, to be fitted or unfitted at pleasure, and to be used " conjointly or separately." I employ a shell of the kind deno- " minated a percussion shell, having the orifice fitted with a " water-tight apparatus. This shell may be of any convenient " form, and is firmly fixed on a metallic stalk, or otherwise made " capable of being fixed on such stalk. A certain number of such " shells are to be kept in store, either filled or ready to be filled, and " are to be used in the following manner:—The stalk, with a shell " fixed on it, is to be screwed or otherwise fastened on to the " upper extremity of a metallic arm or a wooden spar, which " stands ordinarily in front of the stempost of the vessel, forming " a kind of false stem, and which arm or spar has its lower ex- " tremity jointed into a prolonged portion of the keel of the said " vessel, or otherwise into some part of the stem of the vessel " below the water line. The upper extremity of the said arm or " spar reaches ordinarily above the water line, and in this position " receives the stalk of the shell within a receptacle provided for this " purpose. When required to be used, the upper extremity of the " said arm or spar is, by means of another arm or spear which " is jointed to it at or near the head, thrust down into the water " until it reaches a position favourable for its being driven against " an enemy, in which position it may be supported by partially " resting in a groove formed by an extension of the keel, which is " carried out forward in a particular shape for this purpose. " This prolonged portion of the keel may be strengthened by " stays, extending diagonally downwards from the stem; or, " otherwise, the groove may be formed by a prolongation forward " of each side of the stempost. When the arm carrying the shell " is lowered down to this position the vessel may be propelled " against the enemy, and on striking the object aimed at the shell " will explode with destructive effect. A chain extending from

" inboard may be fixed to some part of the said arm or spar
" (first-mentioned), in order to assist in raising it up to its former
" position. The beak to be used, either conjointly with the shell
" or separately, is in like manner capable of being shipped inboard
" or thrust out, as occasion may require, and is formed of two
" iron beams braced together, and of a septum placed vertically
" between them and jointed to them near this forward extremity,
" so that the whole may converge forward to a tool-shaped point
" of some hard substance, the object being that when wanted for
" use the said structure should be run out by means of a tackle
" and rollers, beyond the bow, and that the after-part of the sep-
" tum should drop down to a certain position where it would rest
" against a portion of the bow or stem shaped to receive it, the
" whole structure being retained in this position merely by a chain
" or chains, so that if violently wrenched it may yield, or if jammed
" be even parted with, the after extremity of the beams may, when
" fixed for use, rest against a proper support."

[Printed, 4*d*. No Drawings.]

A.D. 1861, September 19.—N° 2343.

SILVER, THOMAS, and MOORE, THOMAS.—(*Provisional protection only.*)—" Improvements in the construction of, and ap-
" pliances to, steam ships or other vessels." The invention consists, firstly, "in dividing the hulls of the ships by longitudinal" bulkheads, "intersected by transverse partitions. The fore and
" aft partitions to divide the ship into four tubular sections below
" or about the load line, one longitudinal partition to be secured
" to the centre kelson, and the two others to spring from side or
" sister kelsons. The two longitudinal divisional side partitions
" to be carried up to the upper deck and above the same, to form
" the sides of a hurricane deck. The partitions to be stiffened
" with bars of angle iron crossing each other diagonally. The
" angle irons to be made in one piece, so as to form a double
" angle in the shape of a Z. The 'thwartship partitions to be
" stayed with straps or tension rods extending from one side of
" the vessel to the other."

2. " In facilitating the loading or discharging of coals or cargo
" by beam travellers or wheels, flanged or otherwise, running in
" suspended grooves, or working to and fro on rails."

3. "In the mode of fixing the machinery and boilers in the "side sections of the ships, so as to allow the whole centre section "to be free from appliances connected with steam propulsion."

4. "In the arrangement of the screw engines, three cylinders "to which will be fixed longitudinally, the centre cylinder to have "its piston connected with two connecting rods. By this arrange-"ment the centre piston will do the work of preventing the back-"lash, for which two cylinders are required under the common "working of modern engines."

5. "In working a screw under each quarter of the stern of the "ship, with paddle wheels at the sides."

6. In steering "in the ordinary manner, or by steam power, in "combination with an hydraulic cylinder and piston, the latter "being for the purpose of maintaining the position in which the "rudder may be placed by the power of the steam pistons."

7. "In making the hot air pipes for warming the ship to serve "as fire extinguishers, by attaching flexible hose at proper inter-"vals to smother conflagration by steam."

8. "In ventilating the between decks and cabins" "by insert-"ing trap valves in the decks, communicating with pipes carrying "the foul air below, where it will be forced upwards from the "bottom of the ship, and taken up through pipes through the "floors, and extending above the upper deck." "The trap "openings will be covered by gratings. The trap valves will be "made self-acting floats, to close up in the event of water rising "underneath. The tops of the ventilating pipes above the upper "deck to be" "cone-fashioned to increase the draft."

9. "In lighting the between decks" "by inserting honey-"combed or iron-framed glass in all the corridors or passages "throughout the vessel, these diffusers of light to represent the "appearance of an honeycomb, with conical cells and glass bull's "eyes, so shaped as to fit such cells, the upper part of the cells "to have an iron projecting rim, so made as to form cavities for "the reception of elastic or other suitable cushions to keep the "bull's eyes from being forced upwards."

10. "In abolishing all standing masts, yards, or rigging; spars "to be carried to take fore and aft sails in an emergency, and to "be hinged, falling along the roof of the upper or hurricane deck, "to form seats."

11. "In steering floats, worked on either side of the stern or

" quarter by a cogged connecting shaft from side to side of the " ship, actuated by a vertical spindle driving a spur wheel or end- " less screw, or by a wormed screw."

[Printed, 4d. No Drawings.]

A.D. 1861, September 20.—N° 2359. (* *)

WYMER, Francis William.—" Improvements in apparatus " used in sounding the holds of ships or vessels."

" Heretofore for sounding the holds of ships or vessels a " sounding pipe or tube descending through the deck for the " passage of a sounding rod has been employed, and in vessels " fitted with water-tight bulkheads a rod which also passed " through the deck has been used for opening and closing the " bulkhead cock or valve, to allow the bilge water to pass from " one compartment to another. Now, according to my invention, " the tube or pipe for the passage of the sounding rod is com- " bined with the bulkhead cock or valve, in such manner as to " enable the cock or valve to be opened and closed therewith, " whilst at the same time such tube or pipe admits of the sound- " ing rod being, as heretofore, passed down through it, by which " combination and arrangement only one opening through the " deck and one plate or cover will be required."

In one arrangement described in the Specification and shown in the Drawings, the bulkhead cock has a hollow vertical plug " the water passage being through the bottom thereof." The tube which serves as a passage for the sounding rod also acts as a turn-key to the bulkhead cock, when a suitable handle is applied thereto. The sounding rod " is employed in the usual manner, " and passes down through the plug of the cock until it is stopped " by the bottom of the vessel."

In another arrangement a valve is employed in place of a cock. The sounding rod pipe has a valve attached to its lower end, the said valve being raised or lowered against a fixed flat valve face by means of a screw arrangement at the upper end of the pipe.

[Printed, 10d. Drawing.]

A.D. 1861, September 26.—N° 2399.

FLEETWOOD, Daniel Joseph.—(*Provisional protection only.*) —" An improvement or improvements in nails." The invention

" consists in making nails having on their cylindrical or " tapering bodies one or more ribs or longitudinal projections, the " said ribs or projections being either straight or slightly twisted " about the axis of the nail. The bodies of nails made according " to my invention have, in cross section, the figure of a circle " with one, two, or more arms situated radially upon the said " circle. When I give the ribs or projections a twisted or screw- " like figure, I make the twist so slight that it does not interfere " with the driving of the nail. Each of the said ribs need not " pass more than a quarter round the circumference of the " cylindrical or taper body of the nail."

" Nails may be made according to my invention either of brass " or iron, or other metal or alloy, and may be used for sheathing " ships and vessels, and in place of ordinary nails. My improved " nails are driven with as great facility as ordinary nails, and hold " with great tenacity."

[Printed, 4*d*. No Drawings.]

A.D. 1861, September 27.—N° 2414.

SHEILDS, Francis Webb.—(*Provisional protection only.*)— " An improved method" of "applying wrought iron or steel " plates to the covering and protection from the effects of shot " and shell of forts, buildings, floating vessels, and other con- " structions." It is proposed " to employ as a covering to the " construction either in conjunction or not in conjunction with " an internal or external backing or framing of any description, " two, three, or more plates of wrought iron or steel of any thick- " ness, or of such varying thicknesses as may be found convenient " in each case, overlapping or breaking joint with each other and " fastened together by tap screws screwed through some or all of " the plies of plate of which the covering is composed, so as to " form an independent connection of each plate with the other " plates which lie under or over it," the invention consisting in " the combination of the overlap or breaking joint of the plates " with the use of tap-screw fastenings."

[Printed, 6*d*. Drawing.]

A.D. 1861, September 30.—N° 2437.

CHRISTY, Wyvill James.—(*Provisional protection only*).— " An improved method of mailing ships." The improved mail or

armour "is formed of a series of wrought iron belts or girdles "placed one above another in horizontal planes, and separated "from each other by beams of wood placed in the intervening "spaces. The girdles are sufficiently narrow to escape fracturing "and sufficiently near to each other to prevent shot passing "between them: and at the bows they are made to form either a "wedged-shaped or conical beak."

"If the ship or vessel is of wood, I first lay plates of sheet "iron, about ½ an inch in thickness, over the whole exterior "planking of the ship to the usual depth below water. If the "ship is of iron this is not necessary, but a wooden planking "about an inch thick may be employed. Girdles or belts of "wrought iron are then, in either case, to be laid round the sides "of the ship in horizontal parallel rows about 3 inches apart, "and attached thereto by bolts passing through the sides and "secured by nuts or other similar contrivance on the inside. "Each girdle is formed of two bars or narrow slabs, about 4 "inches deep and 6 inches thick, placed on either side of the "ship in the same horizontal plane. They are bolted together at "the stern and elongated, bolted together and strengthened by "braces at the bows, so as to form either a wedge-shaped or "conical projection. Each girdle may also be formed of several "short bars firmly attached to each other by bolts or rivets pass- "ing through iron plates of the same thickness as the bars or "slabs and about 1 inch deep, placed symmetrically above and "below the plane of contact of two adjacent bars, so as to form "two compound bars similar to those first mentioned. The "spaces between the girdles are to be carefully filled with tough "and durable wood."

[Printed, 4d. No Drawings.]

A.D. 1861, October 3.—N° 2467. (* *)

LAW, Henry.—"Improvements in machinery and apparatus "for raising ships and other vessels out of the water for the pur- "poses of examination, cleaning, or repair, some of which are "applicable to the docking of vessels for the same purposes."

The patentee says in the first place:—"In inclined slipways "for the heaving up of vessels out of the water, it has heretofore "been customary to employ some fixed source of power at the "upper end of the slipway, and to impart motion therefrom to

"the cradle upon which the vessel is supported by means of a "chain or rope; and in the case of large vessels, when a very "heavy chain is required, much inconvenience and difficulty is "experienced in disposing of such portion of the chain as has "been hauled up, and power is lost in having to move the chain "in addition to the cradle. To remove these difficulties, I attach "the machinery by means of which the cradle is to be moved to "the cradle itself, so that the two move together without the use "of any rope or chain (otherwise than as such may be employed "as the means of connection), and I effect this by constructing a "powerful rack upon the slipway, against the teeth of which a "pinion or an endless screw moved by the machinery attached to "the cradle is made to bear, and thus a continuous progressive "motion is imparted to the cradle either to raise or lower it along "the slipway; or I effect the same object by means of traction "rods so formed as to lay hold of the teeth of the rack, or of "studs or projections upon the slipway, and which being moved "alternately backwards and forwards by hydraulic pressure, or by "cranks, or by any other known mechanical means, lay hold of "the successive teeth or projections, and thus produce a pro-"gressive motion in the cradle, and by having two or more of "such traction rods suitably arranged, such progressive motion "may be made continuous."

"For convenience, I place the moving power and machinery in "a watertight vessel attached to the cradle, and carry the shaft "or traction rods by which the connection with the slipway is "effected through stuffing boxes or glands, so as to exclude the "water. And furthermore, I construct an air-tight chamber, "open at the bottom, forming a species of diving bell, which is "attached to the fore-part of the cradle in such a position as to "cover the portion of the rack or slipway against which the "pinion, screw, or traction rods, are working, so as to enable "them to be constantly under inspection, and to allow of a work-"man removing any extraneous substance which might otherwise "obstruct the working of the machinery and the progressive mo-"tion of the cradle; and I form the entrance to such air-tight "chamber by a species of air lock, so as to enable a workman to "pass into or out of the same without allowing the admission of "water, and I maintain the requisite pressure of air by means of "an air-pump."

Another part of the invention consists in constructing the

apparatus for supporting the slip when grounded upon a cradle, or in a dry dock, of hinged levers, or jointed or flexible straps capable of adapting themselves to the form of the vessel, so that, by raising up or tightening the extremities of such levers or straps a uniform support is afforded to the vessel, and the "pressure is "more evenly distributed over its surface." These levers and straps may be so arranged and connected by means of rods and ties as to form a kind of net work.

Another part of the invention consists in constructing the blocks or supports upon which the vessel is intended to rest when grounded either upon a cradle or in a dry dock "in such a "manner as to show whether the vessel is bearing upon or in "contact with each block, and also to show the moment at which "such contact takes place with each particular block or support." This is effected by "attaching to each block an electrical appa-"ratus, so contrived that the contact between the block and the "vessel either makes or breaks an electric or voltaic circuit;" or by attaching to each block a compressible tube or vessel, filled with oil, water, or other suitable fluid, and communicating with a pressure gauge or other indicator; or by connecting a wire to each block in such manner that the grounding of the vessel shall cause it to ring a bell or move an indicator.

Another part of the invention consists in "so constructing the "blocks or supports for receiving the ship that they shall retain "and exhibit the form of the vessel, and so enable their upper "surfaces to be exactly adjusted for the reception of the same."

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1861, October 9.—N° 2514.

SIEVIER, Robert William.—"Improvements in batteries for "the purposes of war." The improvements relate chiefly to the framework and skin of the vessel or battery. Vessels or batteries are to be built upon the same general principle as the lattice bridge, by first putting together a lattice work made of separate bars of iron, one rolled straight, and one with sunken spaces. When these two bars are placed crosswise, and are rivetted together, they form a flat surface on one side, so that the plates of iron which form the sides of the vessel or battery may be rivetted to them. The plates are rivetted to the lattice in

a diagonal or oblique position, the second layer crossing the first in a reverse direction. If a third layer of plates is required, it is preferred to lay them longitudinally, and if more, they may take any other direction.

"In forming the shell of a battery with masts in the usual way "of building a ship, I do not build her with ribs in the usual "manner, nor do I think that a lattice work is necessary, as she "could be built on a woodwork framing, which could be removed." The thickness of the iron in the skin should be increased gradually towards the bottom; she should have a partial rib from her keelson a short distance up her sides to give her strength at that part; and should be strengthened with horizontal bands at intervals.

The form preferred for building batteries without masts is that of a wedge, "similar to our quickswimming fish," such vessels are shown in the drawings with guns both under and above water, with double screws placed at an angle with the keel, and with a trunk for raising the anchor into the interior of the ship. An arrangement is shewn for strengthening the vessel, to enable her to stand the blow caused by her action as a battering ram, consisting of a deep longitudinal bulkhead plate, and diagonal beams. It is proposed to mast such a vessel with telescopic iron masts, capable of being stowed along the top of the battery when not in use.

In a battery, or battery and fire-ship combined, it is proposed to adopt a screw of large diameter in a channel at the stern of the vessel; this channel gradually diminishes towards the bow, where it branches out into two parts.

The Inventor also describes an iron reservoir of strength sufficient to bear the pressure of ten atmospheres, and large enough to supply the crew with fresh air for some time when the battery is entirely closed: a means of throwing incendiary compositions into an enemy's vessel; improvements in guns, carriages, and mortars; and in ports through which the guns may be fired under water.

He says also "I find that sheet lead laid on a piece of iron will "turn the shot easily away; the lead acts as any unctuous or "greasy matter or substance will act when a body strikes it at an "angle, and coated on an iron surface; but such fatty matters "are of little use when struck with such force as that of a shot, "nor would lead be of much use if struck lightly. I therefore

" prefer placing a covering of lead on the outside of the battery, ' and which may be easily pinned down by small holes being " drilled in the iron."

[Printed, 1s. 8d. Drawings.

A.D. 1861, October 18.—N° 2600.

SADLER, William.—(*Provisional protection only.*)—" Improve-" ments in armour-plated ships." " Heretofore it has been pro-" posed to build armour-plated ships, so that the sides of the " ship slope outwards to a certain height above the keel, and then " make a sharp angle and incline inwards up to the bulwarks; " and the object of this construction is that shot, when striking " the sides of the ship, may, in place of penetrating, glance off " in consequence of the great inclination of the sides to a hori-" zontal plane. It has therefore, however, been proposed in all " ships designed in this manner to make the angle bend at and " near the bow of the ship under the water line, an arrangement " which greatly injures the sea-going qualities of the ship. Now, " according to my invention, I make the angle bend, above-men-" tioned, above the water line, both at the bow of the ship and " elsewhere; and also I make this bend further above the water " line at the bow, than the distance it is above the water line at " the midship section."

[Printed, 4d. No Drawings.]

A.D. 1861, October 21.—N° 2631.

TOWARD, John.—(*Provisional protection only.*)—" Improve-" ments in machinery or apparatus for bending iron." " This " invention relates more particularly to the bending of T or angle " iron; but it is applicable also to the bending of other sections " of iron, and consists in the " employment " of three rolls (suitably " grooved) driven by any ordinary gearing, and so arranged as " to impart any desired curve to the iron which is passed between " them. These rolls are placed on three shafts, and made to " overhang the bearings, each roller being pushed on its shaft " endwise, and kept in position by a cottar, and driven by a key. " Two of the three rolls are made in two halves, so that one half " may be removed, and thus admit of the easy disengagement of " the hoop *when formed.*

"By changing the position of the rolls from one shaft to the "others, the feathers upon the angle or T-iron may be bent "either externally or internally.

"This apparatus may be obviously applied to the bending of "the frames or ribs used in iron ship-building, by having the "edge of the rolls made to an angle. Any degree of bevil may "be given to the frame or rib, whilst at the same time it is being "bent to the required curve. The rolls might also be fixed to "shafts between the frames or standards of the machine, but it "is preferred to place them on the outside, so that the hoop, "when bent, may be easily removed.

"This peculiar arrangement of rolls may be applied to any "ordinary plate-bending machine."

[Printed, 4d. No Drawings.]

A.D. 1861, October 21.—Nº 2633.

TOWARD, JOHN.—"Improvements in armour plates for ships, "and in securing the same to the sides of a vessel." The invention relates to "a peculiar construction of the back or inner "sides of armour plates for ships, whereby they may be secured "to the sides thereof, without weakening the plates by having "any holes drilled in them or exposing the heads of the bolts or "fastenings on the outer surface of the plates."

"It is proposed to form, either by rolling or forging, a series of "ribs or feathers on the backs of the plates, and to plane such "ribs or feathers to a dovetail section. In attaching or fixing "these plates, bolts are used, having their outer ends made to fit "accurately or grip the dovetailed ribs or feathers, and so hold "the plates firmly against the ship's sides, without passing "through the armour plates. Or dovetail spaces, grooves, or "recesses may be cut out of a plate of the ordinary description, "and the bolt secured therein with a key, or by being made in "two halves, and rivetted together or put together with screw "bolts, after each half is put into the dovetail space, groove, or "recess."

This "system of securing or attaching armour plates, is equally "applicable to forts or other defensive works of a similar "nature."

[Printed, 6d. Drawing.]

A.D. 1861, October 23.—N° 2644.

BEVAN, Alfred.—(*Provisional protection only.*)—" Improve-" ments in the construction of iron vessels and iron-plated ships " of war." The invention relates firstly to the construction of the frames of ships, and " consists in the substitution for the " ordinary single or double angle irons and the rivetting together " thereof for the purpose of forming the frames or ribs and " structural arrangements," " of a series of rolled bars of suitable " sections combined together, chiefly by means of dovetails, and " framed or screwed together in a box-like form, placed at suitable " intervals apart, they in turn forming, in conjunction with the " horizontal strengthening pieces, stringers, or their equivalents, " a series of cellular divisions, by which the surface of the plating " is supported in the greatest number of parts, or the unsup-" ported area reduced to a minimum."

" In cases where the armour plating can be applied direct to the " framing of the ship, I attach or connect the plates thereto " by means of dovetailed projections, from the back of each " box-like vertical rib or frame, taking into grooves formed in " suitable ribs or projections rolled thereon."

The plates are rolled with ribs at the back in two or more places in the width as, for instance, at each vertical edge, and in the middle of the width, or there may be two such ribs or projections. " I form a dovetailed groove in each of the outer " projections, into which one of the two dovetails at the back of " the flat bar of each vertical box frame or rib is made to take," " whilst the other of the projecting dovetails takes into the " groove formed in the projecting rib of the next vertical plate, " and thus they are, as it were, clamped together; or where the " inner edge of the rib along the vertical edge of each plate is " undercut or dovetailed, instead of having a dovetailed groove " formed therein, the plate or bar by which the plates are to be " clamped together or secured may be formed with its outer edge " projecting and undercut so as to embrace the whole length of " the rib, or form one dovetail of the full width." " The spaces " between the vertical box framing or ribs, as described, may be " divided by horizontal shelf pieces, with a flat foot plate forming " a covering plate or band for each horizontal joint of the " external or armour plating, and thus forming small divisions " of square *or parallelogram* form, which should extend from a

" suitable distance below the water line to the upper deck, or
" throughout the space protected by the armour plating, or
" having an extra thickness of plating thereon. Instead of con-
" tinuous bars for clamping together plates at their backs by
" means of the ribs thereon, short dove-tailed pieces or clips may
" be employed to secure them together; in like manner, the
" vertical tapered or plain section bars may be secured together
" by clip pieces."

" Instead of the frames terminating with the line of the upper
" deck, I continue them to the full height of the bulwarks sur-
" rounding the upper deck, and I frame the whole together
" by means of a rolled bar or rail forming a cap bar or bul-
" wark rail, having a projecting bead or nose piece along
" each edge, the under side or under face of the bulwark
" rail being undercut or dovetailed, so as to securely frame
" the external plating or shell with the vertical box ribs or
" frame pieces. In war ships the vertical plates forming the
" bulwarks, being of a sufficient thickness to resist projectiles,
" may be pierced with loop holes or apertures for permitting the
" discharge of small arms, the recesses formed by the vertical
" box frames and the cap bar or bulwark rail forming a shot-
" proof mantlet for each marksman."

[Printed, 4*d*. No Drawings.]

A.D. 1861, October 26.—N° 2681.

COX, NATHANIEL.—(*Provisional protection only.*)—" Improve-
" ments in the mode of connecting and attaching 'armour' plates
" when applied to ships, forts, batteries, and such like." " In-
" stead of bolting the armour plates directly to the side of the
" vessel, I fasten T or angularly shaped pieces to the sides, skin,
" or sheathing, in a vertical position by means of flanges in the
" usual manner; in the armour plates I cut corresponding
" grooves coinciding in outline with the T or angularly shaped
" pieces before mentioned, and then slip or slide the plates on to
" them. I also rabbet or groove the sides, or tops, or bottoms of
" the plates, if required, to give greater firmness and stability to
" the whole. By this means I avoid the holes which weaken the
" sheathing and plates, and facilitate the changing or removal of
" the plates when damaged."

[Printed, 4*d*. No Drawings.]

A.D. 1861, October 28.—N° 2701. (* *)

AUDOUY, Charles.—(*Provisional protection only.*)—"Im- "provements in the mode of and apparatus for raising sunken "ships and other sunken bodies, and also in structures or "apparatus intended for being purposely sunk and raised."

The first part of this invention consists in the employment of apparatus "in which is a chamber or space, or chambers or "spaces," from which the air is exhausted, the apparatus being then brought into communication with the interior of the sunken body "so as to draw out a quantity of water therefrom, whereby "the body is lightened and raised, or its rising facilitated." The communication between the raising apparatus and sunken body may be formed through the medium of flexible tubes, and the interior of the sunken body may also communicate with the atmosphere by means of a pipe arranged for the purpose. The raising apparatus may also be furnished with chains, which may be so arranged as to aid in lifting the body to be operated on.

The second part of the invention relates to "a mode of con- "structing or arranging structures" to adapt them for being purposely sunk and raised. For this purpose a vessel or apparatus is employed, which is furnished with one or more chambers or spaces which may be filled with water through the medium of taps or slide valves, the apparatus being thus caused to sink, and being again raised when necessary by the employment of the apparatus forming the first part of the invention. "The deck or "other part of the structure may be furnished with various fittings "or apparatus for obstructive or other purposes."

[Printed, 4d. No Drawings.]

A.D. 1861, October 30.—N° 2720.

LEIGH, Evan.—"Improvements in the construction of sailing "ships and other vessels." The improvements consist, firstly, in the construction of ships or boats generally "on an odd "number of pontoons, converging to a point on the fore and aft "part of the ship or fore part only." The pontoons are laid longitudinally side by side, and two circular lines are struck from the centre of each end of the middle pontoon. The radius of these circles is determined by the length and width of the vessel

required, " the pontoons being cut through at the ends, and the " sides of the ship erected perpendicularly along the lines of these " curves or segments of a circle. Although I prefer the outer " sides of the vessel being segments of a circle, I wish it to be " understood that the side of a ship may run parallel for some " distance, and then be tapered off fore and aft. As many trans- " verse bulkheads " " are run across the ship as thought desirable " according to its length, which divides it into water-tight com- " partments, and gives great transverse strength. The pontoons " are also divided into more numerous water-tight compartments " transversely, and shod at the bottom with wood outside the " iron bottom, strapped on by" iron straps, " which are let in " flush with the wood. Another application of this principle is " in forming the hull with two midfeathers, tying the bottom to " the decks, in order to merge the three centre pontoons into one " towards the centre of the ship, where light draught is required " combined with large burden capacity." " In the centre part of " the raft or ship all the dead weight of fuel, engines, and boilers " is carried. The outer pontoons have each a screw propeller."

2. In the masts and sails of ships, that they may swivel round a centre in equilibrium.

3. " In working ships' helms by a worm and a sector wheel, " similar to those which turn the sails or masts, and also in con- " necting the two helms," one forward and the other aft, " by " strong wire ropes or tension rods," " which rods cross each " other, so that when one helm is moved the other moves also, " and effects an equilibrium of pressure, by which means a vessel " in motion can easily be turned out of its course by the force of " its own momentum, the pressure of the front helm giving out " the power to bring the aft helm up, and vice versâ. My present " improved construction of vessels enables a principle of steering " steam ships to be carried out more effectually, which I patented " July the Eighteenth, 1849, that shewed how a vessel might be " steered by its steam power."

4. In constructing a raft " upon this principle sufficiently " steady to convey railway trains in the roughest weather across " narrow straits or seas."

5. In " constructing gun boats or vessels of war similar to " commercial ships as regards the pontoons; but instead of " building the outer sides of vertical plate iron, I lay the plates "

one "upon another, and rivet or bolt them together" "like "building a wall. These plates may be of rolled iron or steel, "about one inch and a half thick, and of any desirable breadth, "and may either be laid metal to metal, or have any tough "elastic substance between each layer, such as india-rubber, larch, "or fibrous material, the principle being that the armour plates "form the sides of the vessel, and give it immense strength. "These plates, if made of steel, may be bevilled off at the edges, "and hardened similar to a cold chisel."

[Printed, 1s. 4d. Drawings.]

A.D. 1861, November 5.—N° 2780.

LOVE, John Beresford.—"Improvements in the mode of "combining together and securing to the sides of navigable "vessels and water batteries armour plates of iron or steel." The invention consists in rabbeting and dovetailing the edges of armour plates, so as to produce accurately fitting lap joints that will leave both the inner and outer surfaces of the plates flush or even with each other; also in using tapering or conical bolts through the lapping portions, and in placing between the edges of each connecting pair of plates "a thin strip of soft compressible "metal, gumcloth, tarred felt, or any other similar compressible "and durable material, so that when the said conical bolts are "driven firmly into the holes in the lapping portions of the plates, "in securing the latter to the walls of the vessel or battery, the "packing shall be powerfully compressed" between the oblique faces of the rabbets, "and so produce a perfectly water-tight and "durable joint thereat."

Also "in fitting together the upper edges of the highest tier of "plates and the upper edge of the bulwark of the vessel, for the "purpose of better supporting the said plates, by means of an "overlapping projection or flange formed on the inner side of the "plates at this part; and also in constructing and applying a "capping rail, which will closely embrace the upper ends of the "said flanged plates and the upper edge of the bulwarks, of a "curved form on its transverse section, and firmly bolted to the "part which it covers, so that it shall form a powerful support to "the bulwark of the vessel, and at the same time serve to deflect "shot or shell."

[Printed, 6d. Drawing.]

A.D. 1861, November 6.—N° 2788.

RAMSELL, William.—" Improvements in the construction of " boats, barges, buoys, and other like structures of metal, and in " machinery employed therein." The invention consists " in con- " structing metal boats, barges, buoys, and other like structures, " by stamping the same from one or more plates of metal by " means of machinery, consisting of top and bottom dies or " stamps and moulds, between which the plate of metal is pressed " by steam or other gas, or by hydraulic pressure. I employ a " cylinder containing a piston armed, by preference, with five " piston rods, each and all of which are capable of being connected " to or disconnected from the top die or stamp, according to the " work to be performed. I drive the piston by admitting steam " or other gas into the cylinder, or by hydraulic pressure."

[Printed, 2s. 2d. Drawings.]

A.D. 1861, November 8.—N° 2805.

SIEMENS, Charles William.—(*Provisional protection only.*) —" A vessel and gun, or guns connected therewith, for use in naval " warfare." The object of this invention is the construction of a weapon which is to approach an enemy's ship or works of coast defence in perfect safety to within a distance of from ten to twenty yards, and to discharge against it below the surface of the water a bolt weighing from 15 to 20 cwt., with a velocity not exceeding four hundred feet per second, which bolt or projectile is made to explode after it has struck, so as to produce an irreparable breach in the side of the vessel from three to six feet below the water ine.

The weapon consists of "a vessel 220 feet long, of very sharp " lines, and drawing only from 8 to 9 feet of water, carrying an " engine of 500 nominal horse power which will enable it to at- " tain a speed of from 15 to 16 knots per hour. This vessel is " provided with a curved deck composed of armour plates of, say, " 3½ inches thickness, firmly bolted to strong cross bearers, and " breaking joint with each other, so as to constitute a continuous " rigid structure. This iron deck is covered with solid timber " 6 ins. thick in the middle and two feet thick towards the sides, " forming a regular deck, intended chiefly to weaken the effect of " the enemy's shot before striking the iron." "The only projec- " tions upon the deck are three domes of 5-inch iron, which are

" pierced all round and serve the purpose of 'hatchways' or " 'lookouts,' and for defence in case the enemy should come on " deck. A large brass gun of 8 inches internal diameter, and 16 " feet length, is fixed rigidly into the stern of the vessel about " four feet below the water line." This gun is made breech loading, being closed at the breech by means of wedges, and it can, moreover, be closed at the muzzle in any suitable manner.

From this gun the shell or bolt is to be fired by means of a galvanic battery.

[Printed, 4d. No Drawings.]

A.D. 1861, November 12.—N° 2834.

HAY, William John.—" Improvements in protecting iron and " wooden ships, caissons, dams, and other wooden or iron struc-" tures from decay and from fouling by vegetable and animal " matters, and in preparing the material employed therein." The invention consists " in an improved method of treating the oxides " of copper and other metals to prevent the uncertainty of their " action by imperfect or non-uniform application when used for " keeping ships' bottoms or other structures free from " animalcula " and other animal and vegetable matters; also when used to " preserve woods and other materials from decay and the ravages " of insects. For which purposes I grind in linseed oil the black " or protoxide of copper, and then boil it with linseed oil until it " is reduced to the suboxide, and by thus oxydising and oxy-" dating the oil I form a quick drying cupreous oil, which suspends " the oxyde in the form of a paint or varnish. To this I some-" times add a small portion of silver or other metals and oxydes. " In those cases where greater durability is required from ships " being in foreign stations, or not able to be docked periodically, I " add to the above-mentioned paint an additional quantity of " finely ground suboxide of copper, or when the paint is required " to be black, I add the black oxide of copper in the same manner. " The paint or varnish may be thinned by spirits of turpentine, " naphtha, or any other cheap spirits." Also " in the use of " zinc, either amalgamated or not, in contact with the inside or " outside of iron vessels, ships' iron casings, and other structures, " as a protection against electro-chemical action arising from any " imperfect application of the protective varnish, paint, or other

" material, or from the accidental abrasion of the said protective " coatings, or otherwise."

[Printed, 4d. No Drawings.]

A.D. 1861, November 14.—N° 2869.

WIGZELL, MONTAGUE.—" Improvements in machinery or " apparatus to be used in moulding and casting twisted nails, " spiral fluted nails, bolts, and screws for sheathing vessels, ship- " building, building, and other purposes." The machinery consists of " a plate or plates fitted with any number of nuts, " through which screws of the required pitch work; on the ends " of these screws are attached the screws or twisted form of nails " forming the patterns of the articles to be made, which patterns " by being made to descend, screw themselves into the sand, or " other material used instead of sand, and produce the required " form or mould. The plate or frame containing the screws is " made to rise or fall by a screw or lever, by hand or any known " motive power, and this plate or frame when raised carries with " it the screws and patterns of the nails or other articles to be " made, and causes them to twist or unscrew themselves out of " the mould, the nuts through which the screws work being fixed " and arranged on suitable framework or stand."

[Printed, 6d. Drawing.]

A.D. 1861, November 20.—N° 2916.

BAYLISS, WILLIAM PODMORE.—" Improvements applicable to " buildings in order to facilitate the extinguishing of any con- " flagration which may happen therein." The invention consists in constructing buildings with each compartment, into which the building may be divided, communicating with the nearest chimney or flue or with the external atmosphere by means of channels or tubes, so that if a conflagration should take place it will only be necessary to close the apartment or compartment, and the smoke and fire will find vent by the said channels, flues, or tubes. " Also " for the purposes aforesaid, I provide a cistern or receptacle at " the upper part of the building from which pipes descend, which " reach from the said cistern to the basement of the building, and " may form supporting columns or pillars to it. The tops of the " said pipes where they open to the cistern have proper valves,

" and from these pipes at every floor of the building, other pipes " or channels branch out in such manner that valves may be " applied to stop the first-mentioned pipes at the level, or nearly " so, of such branching pipes, causing the flow of water from the " cistern to run into the said branching pipes or channels, " and thence through suitable apertures into the apartment or " compartment" desired, "and this without allowing the entry " of the water into any other apartment or compartment. The " floors and roof should be fireproof."

These arrangements "may be applied to buildings generally, " including ships."

[Printed, 1s. 4d. Drawings.]

A.D. 1861, December 2.—N° 3023.

BAIN, WILLIAM PELLEW.—(*Provisional protection only.*)—" Im- " provements in protecting ships' bottoms from fouling." The invention " consists in cementing canvas or other textile fabrics to " the bottoms of ships, using asphalte, by preference, for the " cement. After a ship has been sufficiently long at sea for her " bottom to become foul, I strip off the canvas, which will carry with " it all the " animalcula " and other matters which usually foul " the bottoms of ships;" also in "paying over ships' bottoms with " asphalte or other bitumenous or adhesive composition in which " zinc or copper filings, or both, have been mixed or incor- " porated."

[Printed, 4d. No Drawings.]

A.D. 1861, December 2.—N° 3024.

RALSTON, GERARD.—(*A communication from Jacob Snider, junior.*)—"Improvements in the mode of preparing and applying " a certain material on the hulls of iron or wooden ships, or on " the surfaces of materials for building the same, also for prevent- " ing oxidation and tubercles in iron water pipes." "I first take " amorphose graphite and reduce it to fine powder, and free it as " much as possible from impurities. The powdered graphite is then " mixed with oil in a mixer in the following manner:—Slightly " warm the mixer by a coil of pipe heated by steam, so that the " powdered graphite shall not be allowed to cool and take up " atmospheric moisture. Then put pure crude or raw linseed oil " therein, in the proportion of one pound of oil to three pounds

" of the dry powdered graphite, and when these have been gra-
" dually mixed or combined in the 'mixer,' there must be added
" hot pure yellow beeswax in the proportion of about one pound of
" beeswax to every ten pounds of the powdered graphite, the whole
" must then be well and thoroughly incorporated together therein
" previous to being ground cold or at a suitable temperature in a
" paint mill, wherein it must be ground to a consistence equal to
" white lead ground in oil, to preserve it for readily combining
" with additional oil when needed for use. 'Graphite' thus
" prepared with linseed oil and beeswax in any proportion" "I
" claim as the 'graphitic composition.'" It may be applied "to
" iron, steel, or other metal plates for building ships or for casing
" ships outside or otherwise," "for preserving wooden ships, and
" preventing them from getting foul," and for preventing the oxidation of iron or metal bolts, or the decay of the wood in which they are driven. After the application of the graphite composition, a graphite paint is employed, made of the same materials as the composition, except that the beeswax is omitted.

[Printed, 4*d*. No Drawings.]

A.D. 1861, December 5.—N° 3054.

DAVIS, Charles.—(*Provisional protection only.*)—"An im-
" proved composition for coating metal and wood to preserve
" them from decay, applicable as a substitute for copper and
" other sheathing, or other compositions now in use for coating
" ships' bottoms to protect them from the injurious action of
" water."

This composition is made by mixing or compounding together the following ingredients, namely, "coarse brown soap, pitch,
" spirits of turpentine, and elastic glue, such as is now used for
" waterproofing materials, in the proportions of about one quarter
" of a pound of soap to six pounds of pitch, one pint of spirits of
" turpentine, and one quarter of a pound of elastic glue afore-
" said." To be applied hot "with a trowel to the part intended
" to be coated or covered therewith."

[Printed, 4*d*. No Drawings.]

A.D. 1861, December 7.—N° 3068.

CLARK, George.—"Improvements in the use, application, and
" manufacture of iron or steel as armour for ships or batteries."

These improvements are classed under the following heads:—

1. The form of armour plates.

2. The nature of the backing to armour plates.

3. The mode of attaching and fastening armour plates and the backing thereof.

4. The structure forming the back support or foundation to armour plates, and the backing thereof.

The improvements under the first head consist, firstly, "in "manufacturing armour plates with ribs running longitudinally "on the back or inner side thereof, for the double purpose of "adding to the strength of the plate without too great an in-"crease of weight, and of rendering the ribs available for "attaching the fastenings of the plates thereto without per-"forating or diminishing the thickness or substance of the body "of the plate."

2. "In the addition to the plates of transverse bosses, projec-"tions, or ribs in forging or rolling the same." "These bosses, "projections, or ribs, may be added to the under or upper side of "the plate, and are intended to compensate the diminution of "strength of the plates at those parts where the iron is per-"forated or penetrated in any way for the purpose of attaching "the fastenings which hold the plates."

3. "In giving to armour plates a convex surface on the upper "or outer side, and a concave or flat surface on the under or "inner side, the object of this improvement being to diminish "the effect of projectiles on a plate by causing the latter to "receive the impact obliquely."

The improvements under the second head consist of several modes of constructing backing. One is "a system of wrought "or cast iron or steel tubes placed end on between the armour "plates and the ship's skin or planking, and which for distinc-"tion I call the tubular backing." "The mode which I propose "for adapting these tubes as a backing to armour plates is, first, "to attach to the outside of the skin of an iron or the planking "of a wooden ship a backing or foundation iron plate ¼ to "½ inch thick, secured to such skin or planking with rivets or "screws, then to lay the tubes horizontally with one end against "this plate in courses supported by frames of hard wood or other "suitable material;" "or they may be supported by iron framing "or reeved on to bevelled tongues fixed to the foundation plate, "or placed one on the other after the manner of cells in a honey-

"comb; or they may be" rivetted together "by means of rivets "passing through the sides of the tubes. When the tubes are "thus placed and secured, presenting an even surface outside, I "propose covering that surface with packing of a thin sheet of "asphalted felt or cardboard," or other material of this nature, "and then over this packing I propose fixing an iron plate ¼ to "½ an inch in thickness, with or without ribs, to the plate run- "ning between the courses of tubes. This outer plate, which I "call the covering plate as well as the foundation plate, may be "fastened by screw bolts or rivets to the skin or frames of an "iron ship, or by wood screws or bolts to the planks or timbers "of a wood ship, and will, when thus fastened, hold the tubes "securely in their places. The combined structure will form the "backing to the armour plates, of which the fastenings, whatever "their nature may be, may pass through some of the tubes and "through holes perforated in the foundation and covering plates," "and this fastening will draw the backing" and "the armour "plates tight to their bearing."

Cellular backing is also described, consisting of angular-shaped plates of iron, or T, or trough iron, or angle iron bars of various forms fixed between a foundation and covering plate, "so as to "form narrow longitudinal cells, and fastened outside the skin of "an iron ship or the planking of a wood ship in the manner "described for the tubular backing."

The cells thus formed "should be 5 to 6 inches in width, or "about one-third less than the diameter of the shot, the object "to be held in view for the successful application of my tubular "or cellular system of backing being that the width of the cells "shall always be somewhat less than the diameter of the pro- "jectiles to be resisted." "In some cases I intend that the cells" "shall be filled with wood or some other dense and rigid sub- "stance, of which the weight shall not be too great." "I also "propose to fix the blocks or beams of wood to be used as "filling to the cells with bitumen, glue, or cement, in order to "fill up interstices, and thereby more effectually consolidate the "mass and prevent vibration."

3. With reference to the mode of attaching and fastening armour plates and backing, the Inventor described in the Specification of his Patent N° 482 of 1861, "the mode of forming dove- "tail slots on the inner side of armour plates, and attaching "fastenings to them by means of bevelled or dovetailed tongues

"fitting into the slots." "I now propose," he says, "to carry "out the same principle of fastening by forming bolts with dove-"tailed heads," "and attaching these bolts to armour plates or "their backing by inserting the bevelled or dovetailed head of "the bolt into a dovetailed slot formed on the plate or backing. "The dovetailed head of the bolt will thus perform the office of "a bevelled tongue, and may be the head of one bolt only, or "continuous, and forming the head to two or more bolts."

He also proposes securing the bevelled tongues to the structure of the ship by rivetting the bolts which hold the tongues either to the skin or frame of an iron ship, or to an iron plate fixed inside the skin of an iron ship, or upon or between the timbers of a wooden ship; and, in some cases, "to make use of an iron "plate of which the edges of two parallel sides being bevelled "shall fit and slide into recesses, with bevelled edges rolled or cut "into the back of an iron armour plate, and serve as a backing "and as a fastening to such armour plate." This plan he considers to be more particularly applicable to the planks of wooden ships, because the bevelled backing plates can be readily fastened to the planks, and the armour plates would be securely held by this method.

A mode of scarfing the bevilled tongues is also described, in order to facilitate the removal of a plate or series of plates, by drawing it or them out along with a portion of the tongue and bolts attached, without the necessity of removing the plates above, which are fastened on the same series of tongues.

4. To improve the structure of the foundation or back support of armour plates adapted to an iron ship, two angular plates are fastened up and down between the frames, of the same depth as the frames, or nearly so. "One side of the angle of each plate "abuts against the ship's skin plates, and these two sides cover "the space between the angle irons of the frames, and the other "sides of the angle of the angular plates abut one against the "other at right angles to the ship's skin between the frames. In "this arrangement the ordinary caulking plates may be omitted, "and these angular plates be rivetted to the ship's skin plates at "the seams of the latter, whereby the seams will be securely "caulked, and the angular plates be fastened to the ship; or the "two angular plates instead of abutting one against the other, "back to back, may be an inch or two apart, leaving a space

"between them for the passage of the bolt fastenings of the "armour plates or backing. I effect the same object on the same "plan by means of a T plate," "all in one, of the same form and "dimensions as the two angular plates covering the ship's skin "plates between the angle irons of the frames. In either case "the inner ends of the angular plates or of the T plates may be "turned right and left to form a T head inside, over which a plate "may be fastened over all between and to the frame ends with "rivets or screw bolts forming an inner skin to the ship. The "space between the two skins may be filled up solid with wood. "This arrangement will form part of the structure of the ship, "add greatly to its strength, and be an effective back support to "resist the crushing effect on the ship's structure of projectiles "striking the outer plates."

"I propose" the application in all cases when practicable of a packing composed of bitumenated felt, cardboard, gutta percha, or other hard and yielding material between iron surfaces, which require to be closely pressed and held against each other, and "I look upon this arrangement as a means of preventing vibra- "tion as of great importance, vibration in naval armour from "impact of projectiles being in my opinion one of the chief causes "of fracture of armour plates and their fastenings." It is also proposed to introduce a bed of india-rubber or other elastic material over the entire surface of the skin of an iron ship, or the planks of a wooden ship, under the foundation plates of the system of tubular or cellular backing. "I propose that this "elastic bed shall be from a quarter of an inch to an inch or more "in thickness, but the precise degree of thickness will depend "upon and must vary with circumstances which experience will "determine. I wish it, however, to be understood that this "elastic medium will in my opinion be detrimental unless the "structure of armour plates and backing bedded upon it is of "sufficient strength and rigidity to resist the crushing effect of "projectiles, and unless the elastic bed be so arranged that it "shall serve as a continuous buffer to the entire back surface of "the said structure. In cases where rivet heads or the ends of "plates overlapping each other cause irregularity of any surface "over which I wish to place any of the foundation covering or "angular plates before mentioned, I propose to obtain an even "and smooth surface and bed for such plates to bear upon by

" filling in the space between any projecting parts with Roman " or Portland cement, or other similar cement which will harden " like stone."

The Inventor also describes "yielding or elastic wedge plates " for keying or wedging up armour plates to their bearings and " backings;" "an iron tube intended to be used as a sheath, " fixed in wood, through which it is proposed to pass a red-hot " rivet or bolt, so as to protect the wood from being ignited or " burnt by such red-hot rivet or bolt in its passage through the " wood;" "an improved kind of nut, which may be wedged " after the bolt is screwed up;" and a rivetting collar for screw bolt ends, the collar having a conical opening at the outer end, into which the bolt end may be rivetted.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1861, December 9.—N° 3086.

MASON, William.—(*Provisional protection only.*)—" Improve-" ments in applying armour or thick plating to ships and other " structures." The upper and lower edges of the armour plates " are bevilled, and" "thicker plates or bars are employed with " such armour plates, which are also bevilled at their upper and " lower edges to correspond with the edges of the armour plates." " These thicker plates are fixed in a direction running fore and " aft of the ship," in such manner that their bevilled edges may overlap the edges of the armour plates. The armour plates, in addition to being thus fixed to a ship's side, are to be further fastened by the use of through bolts. It is preferred to have wood backing, and " that at the back of the" thicker "plates or " bars there should be grooves formed longitudinally therein to " receive the ends of eye bolts, in such manner that on keys or " bolts being passed through transversely, they will fix the eye " bolts securely to the backs" of the thicker plates. "The eye " bolts pass through the timber and through the skin, and to " prevent the screw nuts which are screwed on to the inner ends " of the eye bolts acting injuriously on the skin, I introduce a " considerable thickness of timber between the screw nuts and " the skin." The thicker plates or bars may be flush with the armour plates on the outside, or they may be made rounding and protrude beyond the armour plating.

[Printed, 4*d*. No Drawings.]

A.D. 1861, December 9.—N° 3088.

NEWTON, SUSSEX.—(*Provisional protection only.*)—" Improve-" ments in apparatus for steering and stopping vessels." The improvements "consist in the application of plates or surfaces " inlaid in the sides of ships below the water line, such plates " presenting a flush surface with the side of the ship when in the " recesses made for their reception. They are made by preference " of considerable length, and somewhat wider at one end than " the other. At the base or wider end they are hinged to the " ship's side; from this point they are laid forward in the " recesses for their reception, and have chains attached at the free " ends, which are rove through eyes or other gear, and laid on " deck or otherwise, whereby the surfaces can be extended at " right angles, or at any other angle to the ship's side, or hauled " close into their respective recesses. One chain extends from the " free end of the surface aft, while the other is led forward and is " by them rigidly secured in any position desired. I employ two, " four, six, or more of these surfaces arranged in pairs, one on " either side of the vessel; where three pairs are used, I should " dispose one pair near the bows, a second pair amidships, & a " third pair towards the stern."

[Printed, 4*d*. No Drawings.]

A.D. 1861, December 12.—N° 3111.

SEARLE, RICHARD.—" Improvements in the treatment, pre-" paration, and combination of metals used for sheathing ships " and marine erections, also for roofing buildings and other " purposes." The invention consists, firstly, " in the application " of " zinc " amalgamated or treated with mercury, or of iron " coated with zinc, commonly called galvanized iron, amalgamated " or treated with mercury, to sheathing of ships and marine " erections, buildings, and other purposes, also for the prepara-" tion in like manner of bolts and nails and other fastenings " used in building or sheathing ships or marine erections, or for " covering or roofing buildings, or for other purposes, particu-" larly those to which copper, yellow metal, galvanized iron, or " zinc in its unprepared state have hitherto been applied." When the zinc or other metal treated with mercury is applied to *the sheathing of ships*, " I place a portion of copper, either in

"partial or absolute contact with it, in such a manner as to "produce a weak galvanic circuit, the strength of the current "being determined by the relative proportions of the two metals "so employed."

And, secondly, in "a method of keeping the bottoms of iron "ships or vessels clean by the application of such proportions of "copper to their internal or external surface as shall cause a "weak galvanic action, but not sufficient to exercise a destructive "influence upon the metal of which they are composed."

[Printed, 4d. No Drawings.]

A.D. 1861, December 19.—N° 3182.

TATE, WILLIAM.—"Improvements in armour, and in making "and applying the same for protecting wood and iron ships of "war and batteries." The invention consists "in the use of and "improvements in the manufacture and mode of applying iron "and steel wire (galvanized or ungalvanized) rope, stranded belts "(of small and of large sized wires), round or flat, applied "singly in belts of iron or steel, or intermixed as one belt, being, "by preference, one-third steel and two-thirds iron wire, as armour "for wood and iron ships of war and batteries, in place of iron "plates, or in conjunction with iron plates. The iron and steel "flat belts should be manufactured to suit the full length of the "ships or batteries from, for instance, fifty feet up to six hundred "feet if required, and from four inches to thirty inches broad, "and from half an inch to two inches in thickness (more or less). "These belts should be laid on in tiers as many as may be "required, and when the proper strength has been obtained, then "planked over with three-inch teak planking, and if required "bolted through all, and then covered neatly (over all) with half-"inch steel plates twenty-four inches broad."

[Printed, 10d. Drawing.]

A.D. 1861, December 30.—N° 3252.

DORMAY, JOHN PETER, AIKENHEAD, JAMES SHIRLEY, and JOHNSON, THOMAS.—"Improvements in the construction "of boats for sailing or rowing." "This invention has for its "object improvements in the mode of attaching or jointing the "planking or skin of a sailing or rowing boat, such improved "*mode being styled by us*, 'flush clinch work,' with bent timbers

" or ribs formed, by preference, in one length or piece from gun-
" wale to gunwale so as to obtain great strength, combined with
" extreme lightness and neatness. For this purpose instead
" of the edges of the planks being put together square, and then
" caulked as hitherto practised in building 'carvel' boats, each
" edge of each plank according to our improvements is bevilled
" and fitted together, then nailed and clinched at certain inter-
" vals, a washer being placed, by preference, over the point of
" each nail before clenching it, by which means not only a flush
" or smooth skin is obtained to the boat, but great strength,
" secure joints without caulking, lightness, less resistance in
" passing through the water, and more correct outline is obtained
" than by the methods in use for this purpose. And in the
" application of our improvements to boats of light construction
" great advantages are derived owing to the facility with which
" they can be repaired. We prefer to heat or steam the planks
" in order to shape or form them to the outline of the boat when
" applying them thereto."

[Printed, 8*d*. Drawing.]

1862.

A. D. 1862, January 1.—N° 5.

WALKER, JOHN.—" Improvements in the construction of forts
" and fortifications which are applicable to floating batteries."
The invention relates "to floating and other guns, towers, forts,
" and batteries for war vessels, and fortifications or coast or
" harbour defences. The gun towers or forts are constructed so
" as to rotate and rise and fall in water-tight tanks; these tanks
" can be fixed on land, or formed in floating vessels, gunboats, or
" ships of war. I construct the ship or other floating vessel
" carrying the forts so that it may be fixed to moorings in any
" required position, so as to rise and fall with the tide, or as an
" ordinary gun boat, and propel the same by steam or other
" power." "I form these vessels with sides shot proof, and with
" decks shot and shell proof, or as nearly so as possible, and the
" whole fire-proof. The rotary gun towers may be made of any
" required dimensions, and to carry any number of guns, and
" each vessel may contain one or more. I introduce the water-

"tight tanks, and place the gun-towers or forts therein for the
"purpose of obtaining an easy and speedy means of rotation,
"thereby to obtain great rapidity of firing by bringing a number
"of guns to bear upon the same point or object, as each is dis-
"charged in succession as the tower turns, and also thereby to
"obtain security for the gunners and men reloading and working
"the guns; and I combine the rotating with the rising and falling
"principle for the purpose of enabling the gunners to adjust the
"line of fire as near as may be to the water line so as to strike a
"ship as near the water level as possible." "The rising and
"falling motion is effected by pumping water into or out of the
"tank." "When the vessel and fort are required to operate at
"sea, I fit the vessel with one or two powerful force pumps, by
"which water can be forced out at either side at the bows, and
"thus the head of the vessel be turned about as required, so as
"to keep the head in a direct line to an opposing ship or war
"vessel or battery." "For protecting the men and guns from
"shells, I form a cone-shaped roof shot and shell proof, with an
"opening in the centre at the top for light and ventilation, and
"under this opening I form an enclosed well hole down through
"the centre of the tower, and through the bottom of the vessel
"open into the water below, so that a shell falling into the
"opening in the roof would drop through the well hole into the
"sea."

The armour plates are fastened by vertical flanges or bars having bolts formed on them, partly by rolling and partly by welding. The plates are rabbetted at the ends, so that the rabbets down the sides of the vertical bars may hold them. The bolts are passed through the inner plates of the tower or the skin of the vessel, and their ends are punched to receive keys, or screwed to receive nuts.

The spaces "between the armour plates and inner plates or skin
"of the vessel are filled in with timber, with the grain at right
"angles to the plates, which are then keyed up tight, making the
"whole compact and solid." The inner plates are rivetted or fastened to T iron or bridge ribs.

"Another mode of fastening the armour plates on the outside
"of the gun towers or forts which I propose to adopt when thick
"timber filling is required, is, by making a number of strong
"iron rings or hoops, and passing them round the tower (made
"slightly tapered to receive them), and forced down over all from

" the top by hydraulic or other power." " I propose to carry the " armour as above-described " entirely round the vessels which carry the forts, and for making the deck of such vessels shell proof, " I propose to cover it with bridge iron." These bridge irons are bolted or screwed down to the under framing or deck beams (or they may be made to form the deck beams themselves), and the spaces are filled in and made level on the surface with timber or other suitable material, so as to form a proper even deck.

" I propose to construct the hull of these vessels " of ribs and covering plates, and 4-inch double T iron rivetted on or bolted through the skin and ribs inside; between these flanges planking, cut to the proper length and guage, is dropt in, and pushed or driven down to the keel, and so on till each grooved space is filled up to the under side of the armour, where a portion of one of the flanges is cut out to admit of the planks being put in. When he planking is completed, it is covered with a layer of felt or other waterproof material to prevent galvanic action, and the whole is covered with a sheathing of copper or Muntz's metal, and the hull is complete.

To form a bulwark round the deck " I carry up the bridge iron " ribs and drop standards into the openings." These standards above the deck line have also double flanges, forming a groove between which the panels are dropt in, and thus the whole of the bulwark can be removed for action, and be replaced as circumstances may require.

Along the after part of the vessel a covered way, shot and shell proof, is formed, giving access from the hull to the tower and the wheel. Access to the guns and gun deck is obtained through the port-holes of the tower, and to the magazine and stores through the deck in the tower, which is made to contain within itself all the necessary war material.

In order to give additional strength and support to the armour, strong angle-iron brackets are rivetted to the side of the hull under the projecting part.

[Printed, 10*d*. Drawing.]

A.D. 1862, January 1.—N° 9.

BROOMAN, Richard Archibald.—(*A communication from Auguste Salzmann.*)—(*Provisional protection only.*)—" Improve- " ments in supporting and propelling vessels." "This invention

" consists in supporting vessels on the water, and propelling them " by means of two or more sets of drums, one set or all of which " is or are armed with floats or paddles. The vessel may be " cylindrical, and may be made conical, or of any other convenient " shape, both at bow and at stern. It is supported clear of the " water, but may be furnished with a keel entering the water. " The paddle drums are driven by steam or other power con- " tained in the vessel. The vessel may be suspended from the " drum shafts by strong springs, similar to those used for loco- " motive engines. The vessels may be furnished with one or two " rudders."

[Printed. 4*d.* No Drawings.]

A.D. 1862, January 8.—Nº 49.

BEALE, DAVID.—(*Provisional protection only.*)—" An improved " method of fastening iron plates to ships' sides." " I com- " mence at the lower part of the vessel by driving from the " outside peculiar formed bolts, which I call dovetail eye bolts, " through the eye of which is inserted a dowel or pin through " the vessel's side, leaving the head of the bolt and dowel or pin " projecting outside the vessel; the plates are so constructed with " recesses at the lower edge as to receive the dovetail head of the " bolt and the dowel or pin, the upper edge with holes to receive " the dowels or pins only; one end of the plates will be grooved " and the other end tongued. The plates are then placed so that " the head of the bolts and dowels or pins shall fit in the recesses " of the same; another row of the same kind of bolts without the " dowel or pin is driven above these plates, and then the dowel or " pin is driven through the eye of the bolt and into the holes or " recesses in the upper edge of the plates, by which means a " great saving of labour is effected and a much less quantity of " bolts is required."

Instead of the above-mentioned bolts, " tapped heads or nuts " made in the form of the head of the bolt above described" may be used, the plates having recesses in both the upper and lower edges, each recess being made to receive one half of the tapped head or nut and dowel or pin. " When the upper and lower " edges of the plates come together the tapped heads or nuts are " fastened to the vessel's side by means of screw bolts from the " inside."

[Printed, 4*d.* No Drawings.]

A.D. 1862, January 10.—N° 72.

JOHNSON, Robert.—" An improved composition for coating " the bottoms of iron ships to prevent their fouling, and which " composition may be used as a protective coating for wood, " iron, or other substances exposed to the action of sea water." This composition consists of " mercurial or blue ointment (a " mixture of mercury and fatty matter), arsenick, and black lead, " in combination with drying oil, oil paint, or common coal tar " or black varnish. I prefer to use the ingredients in about the " following proportions :—Say, two pounds by weight of the " mercurial ointment, say, two pounds by weight powdered " arsenick, with, say, six pounds by weight of black lead in " powder, to one gallon of coal tar, or black varnish ; or paint " oil, or oil paint, or other suitable vehicle, coal tar or black " varnish being preferred. I thoroughly amalgamate the several " ingredients by the use of a mill or a pestle and mortar, " or in any other convenient way. I prefer to apply this com- " position over a coating of common coal tar or black varnish."

[Printed, 4d. No Drawings.]

A.D. 1862, January 13.—N° 97.

BETTELEY, Joseph. — (*Provisional protection only.*)—" Im- " provements in ship building." " In constructing the ribs or " framing of ships or vessels, when iron is used planked over " with wood, in place of using the sections of iron heretofore " employed for the ribs or framing, I employ iron of the following " section, vizt., that is, iron bars, formed flat on the outer side or " surface against which the wood is to be fixed, and formed on " the inner side or surface with flanges at the edges, so as to give " strength to the bars, and so as at the same time to render the " inner side or surface suitable to receive the heads or ends of the " bolts by which the wood planking is fixed to the ribs or " framing. The planks at the outside of this framing are fixed " in a direction from stem to stern, or fore and aft ; then a " further planking is used outside or over the first-mentioned " planking, and such second planking is to run in a vertical " direction from the keel upwards, or it may run in a direction " inclined to or diagonally across the previous or fore and aft " planking, and such outer planking may be fixed to the previous

" planking by bolts, or in any convenient manner, and the seams " of both the plankings may be caulked.

" In constructing deck beams and fastenings for wood ships, it " is preferred to employ two plates of iron, kept at a distance " apart by hollow distance pieces, fixed by passing bolts or rivets " through them at intervals along the beam. At each end of a " beam the two plates are turned outwards from each other, and " between the two plates of which a beam is constructed an iron " knee is introduced at each end of a beam, and is fixed thereto " by rivets or screw bolts. In place of constructing the middle " portion of a deck beam with two plates, as before stated, kept " apart as above explained, the middle portion of a beam " may consist of a single plate, the two ends of the beam " being composed of two plates, suitably kept apart, and bent " outwards at their ends one from the other, as before explained, " iron knees, as before stated, being introduced and fastened " between the two plates where the beam is fixed to a ship's " side."

[Printed, 4*d*. No Drawings.]

A.D, 1862. January 15.—N° 116.

CUNNINGHAM, Henry Duncan Preston.—" Improve- " ments in means or apparatus for protecting screw propellers " from entanglement, or being fouled by ropes or other bodies, " also improvements in means or apparatus for closing up the " screw aperture." For the purpose of affording protection to screw propellers from being fouled or entangled by hawsers, ropes, wreckage, and other bodies, the inventor attaches to the after stern post bars or rods working upon axes or joints fixed to the stern post or to the dead wood. The outer ends of these bars are bent downward into a form to correspond, as nearly as may be, with that of the counter or tuck of the vessel. The bars are capable of being raised or lowered by chains or ropes leading into or on board the ship. When in position for protecting the screw, the outer end of the bar is immersed to some distance below the axis of the screw. From the ends and other parts of the bar chains, ropes, or bars are carried to fixtures on the vessel. In the event of the ship running over a hawser or rope the chains will by this arrangement interpose and prevent the hawser or rope from coming in contact with the screw. By extending smaller chains,

ropes, netting, canvass, or other textile or metal fabric from the chains to the counters, or as high as may be desired, a further protection is afforded against entanglement from floating bodies. When not required for protecting the screw the bars and protecting apparatus are raised. Jointed or flexible bars or ropes may be substituted for the chains described, and the bars may be placed inside cavities or open spaces in the stern post or dead wood, or they may be arranged to work inside the screw aperture or on the aft side of the stern post, so as to be more flush or on a level with the stern or dead wood when hauled up. Bars may also be fitted in front of the screw aperture, as well as abaft it, in order to form a framework for enclosing or protecting the screw; the bars before and abaft the screw aperture would be connected.

"By increasing the number of the bars on the principle of a "carriage hood or fan, and by applying circular shutter-like plates "or bars to the outer surface, I obtain a more complete enclosure "of the screw" than that here described.

The improvements in closing up the screw aperture consist in the employment of shutters, hung one on each side the after stern post or other convenient part to close the aperture in the dead wood when the screw is raised out of the water. "The after stern "post must be the same width or wider than the screw aperture" to carry shutters wide enough.

[Printed, 1s. Drawings.]

A.D. 1862, January 18.—N° 138.

WINANS, William Louis.—"Improvements in the manner of "mounting and apparatus for manœuvring cannon or ordnance "on ships or vessels of war and floating batteries." "The first "and principal objects of these improvements are to do away "with the necessity for port-holes or embrasures in the sides of "vessels of war and floating batteries through which to fire "cannon, and more perfectly to protect the men, cannon, and "other contents, as well as the interior parts of vessels of war "and floating batteries, than is practicable by any system yet "employed or before known."

"These objects are attained by raising the cannon from a place "of security below the upper deck, or from behind the bulwarks "of a vessel of war or floating battery, just before firing it, to "*such a height as may* be necessary in order to give it the proper

" direction, and to clear the decks and waterways or bulwarks of " the vessel or floating battery, and so soon as it shall be dis- " charged by lowering it to its place of security below deck or " behind bulwarks, as the case may be, to be re-loaded and " prepared for re-firing."

" A gun, with its carriages and platform, may be raised either " by steam power applied direct, or by steam or other motive " power applied through the intervention of hydraulic pressure, " or by steam or other power applied by means of gearing, or by " means of a combination of screws or pullies and chains or " ropes, or other equivalent mechanical contrivances. The gun " can also be lowered by means of similar mechanism, but the " arrangement I prefer to employ for this purpose, consists prin- " cipally of a steam cylinder, in which works a piston, which is " suitably connected to the under side of the platform, which " supports the gun with its appurtenances, and which is raised, " together with its load, upon the admission of steam to the " cylinder. The gun and its platform may, when desired, be " lowered by opening a cock and allowing the steam to escape " from the cylinder. It is necessary to make provision for sup- " porting the gun and its appurtenances when raised to the " required altitude, and for counteracting the lateral and vertical " recoil during the firing. This may be done in several ways, " but I prefer the undermentioned, because it is easily managed " and not liable to become deranged."

" I cause the platform to be guided during its elevation by " guides sufficiently strong to resist the lateral recoil of the guns " during the firing; and in order to support the gun when at its " proper elevation sufficiently to resist the vertical recoil, there " are many ways that may be adopted, amongst which sliding " bolts, ratchets and palls, or their equivalents, may be employed " in connection with substantial stanchions, or other means of " support, but, by preference, I make use of one or more columns " of water or other fluid. On the under side of the platform, I " place usually two cylinders, in which work pistons or plungers, " which are attached to the platform. These cylinders are con- " nected with a tank containing water or other fluid, and are " provided with valves, which admit the fluid below the plungers " as the latter are made to rise by the uplifting of the platform, " to which they are attached. The valves will, of course, close " *when the gun is in* position for firing, or immediately the

"upward motion is arrested, the platform, with the gun carriage "and its appurtenances, will thus rest on two columns of water "or other fluid. By opening cocks in the lower ends of the "water or fluid cylinders, the water or other fluid will be allowed "to flow back into the tanks as gradually as may be desired, and "the platform, with the gun and appurtenances thereon, will "descend by gravity to the lower position ready for reloading. "It will be convenient to make the lower end of the pistons or "plungers of the water or fluid cylinders concave or hollow, so "that they may contain a body of air, which will serve as a "cushion to diminish the shock." Sliding doors or covers of iron, or other suitable materials are provided for closing the cannon hatchways, and these covers may be worked by the agency of steam.

"By this system or improvement, one gun or cannon may be "raised and discharged, whilst others immediately in the rear or "advance of it are being loaded, consequently, most if not all of "the cannon from different sides and parts of a vessel of war or "floating battery, may be brought to bear in any given direction "without the interference of one with another. Hence several "pieces of cannon may be placed one immediately behind "another on a given front, and all fired in the same direction, "thus enabling a greatly increased number of cannon to be "brought to bear from a single tier on a vessel or battery in any "given direction."

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1862, January 20.—N° 145.

LAMB, Andrew, and WHITE, John.—"Improvements in life "boats." This invention relates to certain improvements "in "the construction of sea-going life boats, by which, in addition "to their quality of safety for life-saving purposes they are "adapted for war purposes, being capable of carrying securely a "piece of ordnance in the bows."

"We construct life boats" "with longitudinal water-tight com- "partments or air chambers formed on each side of the boat, and "extending from stem to stern, or between the bow and stern "compartments, and carried up to the gunwale; these are com- "bined with bow and stern water-tight compartments extending "from side to side of the boat. These bow and stern compart-

" ments should be only of such a height from the bottom as to " leave a space below the top side of the gunwale, the space thus " left being made available for seats when not designed to be " otherwise employed; or in certain cases these compartments " may at the sides extend above the line of gunwale, leaving a " flat space or recess sufficiently below the line of the gunwale to " enable the weight of persons seated in such recess to be kept as " low as possible.

" For the purpose of carrying a gun forward, the water-tight " compartment at the bows is extended in length sufficiently far " aft to provide a suitable bearing for the gun carriage, and to " enable the gun to be worked clear of the mast; and by the " additional buoyancy which is obtained by the increased capacity " of this compartment, the gun may be floated in the event of " the longitudinal water-tight compartments becoming damaged " by shot, or their floatative power otherwise destroyed."

By the division of the longitudinal air cases or chambers into smaller water-tight compartments the safety of the life boat may be increased.

Each of the divisions of the longitudinal air cases may have in addition to water-tight scuttles on the upper side water-tight plugs or valves fitted, so that perfect ventilation of the interior may be insured when the boat is out of use. Two or more delivery tubes may be fitted in the bottom of the boat, with valves so constructed as to prevent the admission of water from without and to free the boat from water. These tubes may be used for the purpose of taking soundings. Tubes may also be so placed as to enable a bower anchor, slung under the bottom, to be carried out to a ship in distress, the ropes and slings passing through these tubes.

[Printed, 8d. Drawing.]

A.D. 1862, January 27.—N° 205.

LILLIE, Joseph.—" Improvements in the method of protecting " ships' bottoms from fouling, and in materials to be used there- " for." These improvements consist, firstly, in applying a sheathing of tiles composed of earthy matters. The tiles for this purpose are manufactured so as to correspond to the form of the bottoms and sides of the vessel to be sheathed or covered, and *have an enamelled or glazed* surface on the exterior and a rough-

ened or indented surface on the interior. They are secured to the hull of the vessel by means of cement, marine glue, or other suitable adhesive material, or by means of metallic ribs fixed at intervals, such ribs being formed with flanges capable of holding the ends of the tiles, their opposite ends being dovetailed so as to receive correspondingly formed tiles between the ribs, the space between the inner surfaces of the tiles and the hull of the vessel being filled with cement.

2. "In protecting the bottoms of ships and vessels from fouling "by the application of the wax known as the Japanese wax." "This wax may be applied as a coating or covering of from one-"sixteenth to a quarter of an inch in thickness, with or without "an admixture of chalk or other calcareous matter, being laid on "to cover the surface of the hulls, when in a melted state, in one "or more layers until the requisite thickness is attained."

3. "In laying a coating of Portland cement, of a thickness, say "three-quarters of an inch, or thereabouts, on to the external "portion of the hull of the vessel, with an outer thinner covering "of Japanese or other suitable wax laid on and over the outer "surface."

4. "In applying a mixture of fine sea sand or gravel, so as to "form a sort of concrete with a roughened surface, well adapted "to adhere to the vessels, and to receive a coating of the said "Japanese wax or other wax capable of hardening under water."

"In furtherance of the above objects I employ strychnine, "arsenic, and other similar deleterious substances for the destruc-"tion of animal matter usually adhering to vessels."

[Printed, 4d. No Drawings.]

A.D. 1862, February 3.—N° 282.

HILL, LAURENCE.—"Improvements in applying armour plating "to war ships." These improvements in applying armour plating to war ships are designed to obviate the weakening of the armour plates by bolt holes, and to protect the edges of the plates. For this purpose fastening bars are employed between the longitudinal edges of the plates, and also, if desirable, between the butts. "The fastening bars are made of greater depth than the thickness "of the armour plates, and they are formed with an enlargement "at their outer edges, such enlargement being shaped to overlap, "secure, and protect the edges of the adjacent armour plates. "The outer rib or enlargement may be made either angular

" or rounded, with the view of deflecting shot. The fastening " bars are themselves fixed to the vessel's side or framework by " means of screw bolts tapped into them from the inside, but not " entering so far as to weaken the outer rib or enlargement. It " is preferred, instead of applying a teak or wooden backing " between the armour plates and the inner skin of the vessel, " rather to give an increased thickness to the plates, and to apply " them immediately against the inner skin, and the holding bolts " are by preference formed with enlarged shoulders, the better to " resist transverse strains that might otherwise loosen the " plates."

"The improved mode of fastening is applicable with the armour " plates arranged either in horizontal or in vertical lines; and in " the former case the fastening bars are used in long lengths, so " as to give increased strength to the structure, whilst if they are " arranged vertically," "the improved arrangement will permit of " the armour plates being easily removed and stowed in the " vessel's hold, or of their being replaced, as circumstances may " require."

[Printed, 1s. Drawings.]

A.D. 1862, February 6.—Nº 314.

SHORTREDE, Robert.—(*Provisional protection only.*)—" Im" provements in the construction of ships of war with armour " plates." "In the construction of armour-plated ships as at " present practised, the plates are attached as dead weight to the " outside of the ship, and are generally weakened in their sub" stance by the holes in them for the bolts attaching them to the " ship, and sometimes also by their being chamfered at the edges. " Water is apt to penetrate between the joints and to lodge " behind the plates, and in a heavy sea the plates are apt to play " on each other at their edges, thereby necessitating frequent " repairs. The object of my improvements is to remedy these " evils and increase the strength of armour-plated vessels, for " which purpose I propose to make the plates solid in their defen" sive front, with flanges all round their inner edges adapted to " their being bolted or rivetted to each other through these " flanges, thereby forming in effect one continuous plate. " Such armour plates will also be connected to the thinner plates " covering the lower part of the hull by the upper row or tier of

"these lower hull plates having similar flanges, to which the "flanges of the lower course of armour plates will be bolted or "rivetted. The armour plates when thus bolted or rivetted to "each other and to the sides of the hull will form an integral "part of the ship, adding greatly to its strength and stiffness, "while moreover the joints may more readily be made and kept "water-tight and without play on each other."

[Printed, 4d. No Drawings.]

A.D. 1862, February 6.—N° 315.

ASTLEY, Peter Hyde, and LEIGHTON, Crosby.—"Improvements in the construction of life boats, applicable also to "ships' boats, gun boats, or other vessels." The improvement is as follows: — Instead of the bottom of a vessel being formed in the ordinary manner, it is to have a hollow chamber or cavity running from stem to stern, the roof of the chamber projecting into the boat, and occupying the centre of it from stem to stern. The chamber is formed on the under side by a flat perforated bottom, having a curved keel on each side or boundary of it, and a straight keel along the middle. In the centre and on the top of the chamber inside the boat a stop cock will be inserted, whereby the boat's buoyancy can be regulated with any known and suitable air or pneumatic apparatus; or several conic cavities or chambers may be adopted for each vessel, and any suitable and known means of exhausting or compressing the air contained in them when on the water may be adopted. Cavities or troughs of different shapes may be used, or one cavity or inverted trough may be placed within the other, the intermediate spaces being partially or wholly closed and made air spaces, or filled with materials of less weight than water. By these arrangements the vessel is expected to become a much safer means of transit.

[Printed, 10d. Drawing.]

A.D. 1862, February 7.—N° 328.

CLARK, William. — (*A communication from Henri de Lapparent.*)—"Improvements in preserving timber, which are "particularly applicable to the timbers of ships or other maritime "structures." This invention consists in a peculiar arrange- "ment for carbonizing large wooden constructions, such as the "hull of a ship."

1. " In order to deprive the wood of its sap, I avail myself of " the principle termed endosmose, that is, I plunge the wood " into soft water, which being less dense than the sap juices " forces out the latter, and fills all the fibres of the wood in its " turn."

2. "The wood after having thus imbibed the water, and being " entirely deprived of sap, is placed in the open air to be dried, " which may be effected in a short time, according to the size of " the wood blocks, either completely or artificially." The wood may be artificially dried " by means of an apparatus of Messrs. " Légé and Henry Pironnets' invention for injecting poplar and " beech woods with sulphate of copper; this apparatus consists " of a cylinder, in which after having introduced the wood and " hermetically closing the end, a jet of steam is passed through " the wood, in order to heat it and dilate the pores, after which I " obtain a vacuum by establishing communication between the " cylinder and a cold water condenser at the same time that " the air pump is worked. The wood is then ready to receive a " current of heated air with which a certain quantity of sulphuric " acid is mixed, in order to prevent any formation of fungi on the " ship's bottom. I may also apply a paint below the water line " composed of flour of sulphur 200 parts, linseed oil 135 parts, " boiled oil and manganese 30 parts. This paint by its sulphurous " odour will prevent all incrustation forming on the bottoms of " ships."

3. " The wood having been subjected to the above-mentioned " treatment is then finished and put together in the usual " manner; there now only remains to char the entire surface in " order to preserve the wood." This is done " by means of a jet of " gas, which I cause to impinge on the surfaces to be charred." " Lighting gas, whether in a state of compression or not, may be " used with advantage for the purpose; but if this is not to be " had, I may employ hydrogen, or still better, oxide of carbon, " which is easily produced."

" When constructing hulls of ships in ordinary an error is " committed in so enclosing the frame of the vessel as to prevent " any communication with the exterior air. A good method " would be to place the shell of the vessel in communication " with the exterior air by making small holes in the sides, which " would not weaken the parts to any great degree."

[Printed, 8*d*. Drawing.]

A.D. 1862, February 7.—N° 330.

BARTHOLOMEW, William Hamond.—" Improvements in " barges or vessels suitable for the navigation of canals and " rivers." " I so construct barges that they may be coupled " together end to end, so as to form a compound vessel of any " desired length. Each of the barges to be employed as an " intermediate section or compartment of such a compound " vessel is made nearly rectangular in plan, but somewhat convex " both at stem and stern. In the centre of the stem of each such " barge a projection somewhat similar to the cutwater of an " ordinary vessel is formed; this cutwater, when several barges " are coupled up into a compound vessel, enters a corresponding " recess in the stern of the barge in front of it. The couplings " may be of any convenient construction, and should keep the " compartments constantly in contact the one with the other." " The barge to be used as the leading compartment of the com- " pound vessel is tapered in front, so as to be resisted as little as " possible by the water in passing through it, and, similarly, the " barge to be used as the stern compartment of the compound ves- " sel is so formed as to suit it for this position, and is fitted with " a rudder. The steering of the compound vessel is, however, to a " great extent effected by chains or other connections, which pass " along each side of the compound vessel from stem to stern. " They are each attached at one end to one of the terminal " barges, and at the other they are passed round a capstan or " windlass at the other extremity of the compound vessel, and " the chains or connections are passed through suitable guides " on each of the intermediate barges. By turning the capstan " or windlass, the chain on one side of the compound vessel " (supposing a chain to be employed) is wound up, and the chain " on the other side is slacked out to a corresponding extent, and " thus the compound vessel is drawn into a curved form, each " barge pivotting about its projecting cutwater." " The barges " are, by preference, constructed of iron, and they are each fur- " nished with a water-tight door or doors at the end, side, or " bottom, so that when the barges have arrived at their destina- " tion, and are disconnected, they may each be lifted bodily out " of the water, the door or doors opened, and the cargo discharged " through it or them; in a similar manner the barges may be " loaded. The barges (by preference one of the terminal ones) " *may, if desired,* be fitted with propelling apparatus."

[Printed, 1s. Drawings.]

A.D. 1862, February 10.—N° 343.

PIM, Bedford Clapperton Trevelyan, and FAWCUS, George.—(*Provisional protection only*).— "Improvements in "uniting iron plates, and in uniting and fixing armour plates on "ships and other structures."

The "invention consists in uniting iron plates to one another "by means of double-shaped keys or rivets, which we drive into "dovetail grooves formed in each of the plates to be united. "The double shafts are united and form but one piece by means "of a web, which, when the parts are in position, comes in the "same plane as the seam between the two plates. The grooves "may be of the regular angular dovetail, or they may be circular "or of any other suitable form, but of course must correspond "with that of the key.

"When for the purpose of uniting armour plates, and fixing "them to any structure, we form one or more slots through the "key or rivet at that part which, when in position, will come "behind the structure to which the plates are to be fixed, and we "insert pins into the said slots. In addition to this means of "fastening, or in substitution for it, we sometimes taper off the "double-shaped key or rivet into one shaft at the point, thread "it, and after passing it through a hole in the framework of the "structure, fasten up by a nut."

[Printed, 4*d*. No Drawings.]

A.D. 1862, February 12.—N° 366.

ROBB, John.—"Improvements in ventilation, and in apparatus "employed for that purpose." The invention consists of certain improvements in ventilating churches, dwelling houses, and other buildings, ships, railway and other carriages, and other places requiring ventilation. "The principle which I have adopted in "carrying these improvements into effect is that of admitting the "necessary supply of fresh air at a low level, and carrying off "the heated and vitiated air at a higher level, a continuous "movement of the atmosphere being thus kept up, while at the "same time all disagreeable or hurtful effects from draught are "obviated by the peculiar arrangements which are employed for "that purpose."

"In *ventilating dwelling houses* which have been constructed

" without any special appliances for the purposes of ventilation, I " accomplish the object in the cheapest and readiest manner by " making one or more windows the medium or media for the in- " gress and egress of the air. The upper sash is drawn down so as " to leave a suitable opening ,say of two or three inches, the lower " sash being drawn up to a greater extent, the width of such " opening being adjustable by raising or depressing the sashes. " The ventilating apertures being thus adjusted, a current of " fresh air will enter at the lower part of the window, while the " upper opening will allow the heated and vitiated air to escape. " The ventilating openings are covered with perforated or pervious " material, a continual supply of fresh air being thus admitted " into the apartment or other place to be ventilated, but the cur- " rent of air being divided into minute streams by the structure " of the interposed material, all unpleasant or injurious effects of " draught are prevented. The material which I prefer for this " purpose is perforated card paper, manufactured in sheets of a " size to suit any ordinary window, and rendered waterproof by " the application of a solution of india-rubber or other suitable " waterproofing substance or substances, and painted, varnished, " and ornamented as may be desired. Wire gauze may be em- " ployed, but the material I have before mentioned is cheaper " and also more durable than wire gauze which soon becomes " oxidised and rendered unfit for use when exposed to the " atmosphere. The perforated or pervious material is framed " in wood, metal, or other suitable material, and made to fit " close to the window sashes, only leaving room for the latter " to be freely drawn up or down. If desired, the lower portion " may be so constructed and arranged as to form a blind."

"The perforations I prefer to be four hundred to the square " inch for the lower sash and about two hundred for the upper " opening ; the plan above described is, however, subject to one " defect, namely, the opening at the middle of the window will " still admit a current of air, and cause some draught, and " also admit dust. This may be obviated by adopting another " modification of my invention, which is to fit or fix the perfo- " rated or pervious material into or upon the window sashes " themselves, the glass or other material placed in the sashes in " lieu thereof being made movable so as to adjust the openings " for the ingress and egress of air."

The inventor also describes the application of his invention to

new buildings of large size, in which suitable chambers or channels are employed. The ventilating surface is formed in all cases of perforated or pervious material, the air being thus transmitted from the chambers to the apartments or places to be ventilated at a low level, there being provided suitable tubes or outlets (covered with perforated or pervious material) at the upper part thereof, for the escape of the heated and vitiated air. The ingress and egress of the air is regulated by means of valves properly arranged for that purpose.

These chambers may in some cases be formed or placed in the vicinity of a fire-place or furnace, by which means the air may be heated before being diffused.

[Printed, 4*d*. No Drawings.]

A.D. 1862, February 12.—N° 373.

SAMUELSON, Alexander.— " Improvements in building " ships and vessels." In constructing the framing for the body of a ship or vessel according to this invention, it is arranged so as to form " vertical ridges" or box girders, and these ridges or girders are produced by rivetting plates to suitable angle irons and to each other, and their horizontal section may be varied in form. " The rivetting of the plates to each other and to the angle irons " employed is to be in such a manner as to render the parts " water tight, so that not only is a framing produced consisting " of upright ribs of angle irons, but the plating (which consti- " tutes part of a frame)" " acts as an internal water-tight skin." To the inner sides of the ridges longitudinal stringers or framings are fixed by rivetting, or otherwise, and internal plating or ceiling may also be applied. " When the side of a ship or vessel is to be " coated with armour plates the armour plating is applied over " the outer ridges in the following manner:—The two ends of " each armour plate are, as has before been proposed, turned up at " right angles, so as to form flanges thereto. The top and bot- " tom edges of each armour plate are formed square with the " inner and outer surfaces. The flanges at the ends of each " armour plate are made tapering or wedge shaped on their inner " sides, so that when the two ends of two contiguous armour " plates come together they form a solid angular mass correspond- " ing in dimensions with the angular recess between two angular

" ridges of the frame or body of the ship or vessel, and these two " flanges are bolted or fastened to each other and to the plates " between which they come, whilst the ridges of the framing " which are intermediate of the flanges of the armour plates come " against and support the back surfaces of the armour plates. " The upper and lower edges of the armour plates of each strake " form butt joints with the lower and upper edges of the strakes " of armour plates above and below them, thus the armour " plating forms, so to speak, an outer skin. Where the above-" described system of inner plating and framing is employed " without armour plating, then a suitable skin is affixed, consist-" ing of plates rivetted to each other, and also to the angle irons " at the angles of the outer ridges."

[Printed, 8*d*. Drawing.]

A.D. 1862, February 14.—N° 397.

DODSON, Arthur John.—(*Provisional protection only.*)—" An " improved composition for coating, covering, or protecting " ships' bottoms; applicable also for coating or covering railway " sleepers, telegraph wires, and other surfaces, and likewise as a " cement, and as a substitute for metal for certain constructive " purposes." The " invention consists in the manufacture of a " composition suitable for the foregoing purposes, by combining " pulverised slate with vegetable or mineral pitch. Instead of " using the slate pulverised, I sometimes take it in an otherwise " considerably reduced or divided condition."

" The proportions I mostly recommend, without, however, " restricting myself thereto, are as follows:—Two-thirds slate to " one-third pitch; I sometimes combine tar with the pitch."

[Printed, 4*d*. No Drawings.]

A.D. 1862, February 24.—N° 493.

WESTMACOTT, Percy Graham Buchanan.—(*Provisional protection only.*)—" Improvements in constructing and applying " armour plating to ships, vessels, and forts." " For these pur-" poses armour plates are composed of iron or steel, or of both " iron and steel; the metal is made into the forms of rings or " endless bars, which are shrunk one on the other until the " desired dimensions and forms are obtained."

" The rings used in constructing a plate may, when desired, be

"of different depths from front to back of the plate, so as to "extend on one side or on both sides of the plate beyond the "other rings of which the plate is composed, and thus present "facilities for fixing the plate to others, and to the framing or "other parts of the structure to which such armour plates are "applied."

"The employing rings or endless bars shrunk on each other in "forming armour plating admits of the metal of each ring, bar, "or part of an armour plate being better worked than similar "metal rolled or hammered in large masses, and the thick plates "are manufactured cheaply as compared with the cost of forging "or rolling plates of similar thickness each in one piece as here-"tofore practised."

[Printed, 4d. No Drawings.]

A.D. 1862, February 25.—N° 501.

WILKIE, DAVID.—(*Provisional protection refused.*)—"A com-"position to be used on the bottoms of sailing vessels and "steamers for the prevention of barnicle and other matter "adhering thereto while employed in sea water." "The com-"posing to be used is made from seaweed, commonly called sea-"tangle or wreck; likewise a fluid extracted from haddock or "other fish, to be amalgamated into one fluid or body."

[Printed, 4d. No Drawings.]

A.D. 1862, February 26.—N° 517.

STEPHEN, ALEXANDER, junior.—"Improvements in the con-"struction of ships or vessels." This invention is intended to prevent or diminish the injurious corrosion supposed to arise from galvanic action, and hitherto occurring in those constructive details of ships or vessels in which two different metals and wood are combined in such a way as to be accessible to moisture, and consists in applying to such parts "a protecting impervious or "non-conducting covering, coating, or varnish of a viscous, "resinous, bituminous, or vitreous substance, such as water-"proof glue, or a water-proof or insoluble cement, such a "Portland cement."

In those portions of a ship or vessel where copper, yellow metal, or composition bolts or fastenings pass through timber and then through iron, there is first interposed between the iron and wood

a layer of protective coating extending for a few inches around the bolt hole so as to exclude water or moisture. The bolt or fastening is then passed through and fastened by a screw nut on a washer, by clenching or by other means, and a protective covering or coating is applied to the inner end of the bolt or fastening. By these means the inner ends, the parts between the wood and iron, and the parts passing through the iron, are effectually isolated and protected from water or moisture, and the injurious action is thereby prevented from taking place.

[Printed, 8*d*. Drawing.]

A.D. 1862, March 13.—N° 697.

NEWTON, WILLIAM EDWARD.—(*A communication from Edward Cox.*)—"An improvement in armour plates for vessels of war." This invention relates both to armour plates applied on the outside of wooden hulls and to iron plates attached directly to the frame of the vessel, whether such frame be constructed of timber or of iron, and consists in fitting together and combining the marginal portions of armour plates by a double groove or clutch whereby the plates will be so locked as to hold each other both in a direction lengthwise of the vessel to which they are applied, and also in a vertical direction, and will thereby assist in holding each other to the sides or frames of the vessel and in strengthening the vessel; the necessity of using plates of very large size will thus be obviated.

[Printed, 8*d*. Drawing.]

A.D. 1862, March 18.—N° 751.

DUNN, THOMAS.—"Improvements in the construction of "bridges, roofs, houses, and other structures." The invention consists "in certain improved modes of constructing beams, "girders, bridges, roofs, fences, ship sides, and other structures, "and in the application of such improved beams and girders, and "of beams and girders of the ordinary construction in an im"proved manner."

"In the construction of beams and such like structures, I use "rolled plates with webs at the top and bottom, as heretofore "customary, to which lattice work at one or both sides is added; "and for ornamental beams or pillasters, I apply round rings "or other formed truss or lattice work to strengthen the said "*plate beams.*"

"In the construction of trussed or openwork girders, I use "iron and steel of various new sections for this purpose, the "object being to take the strain off the rivets, and to make "stronger and more lasting joints. When plates or bars with a "middle rib are used for lattice work or otherwise at the joining "of two such plates or bars, the middle ribs are cut out so that "when they come together the shoulders abut against the edges "of the plates or bars, and thus relieve the strain on the rivets."

"The iron for larger work may be rolled with two or more ribs "on one or both sides, or they may be corrugated, the ribs or "corrugations being cut away, or partly so at the joints or cross- "ings to relieve the strain on the rivets. Railway bars may also "be used for very heavy structures, and where it is difficult to "get bars or plates of the above described sections, I use com- "mon flat bars, and work them over and under each other alter- "nately like basket work, thus causing the bars to bind closer "together at the crossings, and relieving the rivets to a certain "extent; for lightness and durability steel plates and bars are "recommended. At the crossings of T iron four small rivets "are used in the place of one large one, as heretofore. In using "ribbed iron or railway bars, a strengthening plate may be added "for extra work. In wood structures I construct compound beams "of two triangular pieces of wood with the widest part of the "timbers outside; these two triangular pieces are connected by "driving in a funnel or hollow trenail to keep the timber work "together, and afterwards I insert a screw, bolt, or rivet, this gives "double security, as should the bolt break the hollow trenail "secures the work. I also place metal saddles or plates between "the timbers to secure them together; these saddles or plates "may be trussed transversely.

"For diagonal trusswork, the triangular timbers are placed with "the broad sides towards each other, and connected at the cross- "ings by plates of iron half round, or any sections of wood may "be used instead of triangular. A very strong wrought iron beam "may be formed of two angle irons connected by plates or lattice- "work, and trussed transversely.

"For houses or works of defence and ship sides I use iron or "steel to cover the same like fish scales, made conical, corrugated, "or of any shield-like form to break the force of the projectile; "these scales are *made portable* so as to be easily removed when "*broken, or to cover port holes* in ship sides, their object being

"to break the force of the projectile and stop it from entering "the main structure, and to be readily replaced; when the shields "are not required to protect the sides of the ship they may be "stowed away to serve as ballast."

"In some cases I construct a series of sheet iron compartments "or cells, which are filled with compressed brushwood or other "suitable material. These cells are wedge-shaped in section, and "they are secured together by bolts when applied for ships or "fortifications; the shot striking in a joint or in a cell-plate, will "be received within a cone, thereby stopping its progress gradu-"ally, And a modification of this part of my invention consists "in covering the brushwood with elastic steel plates or wirework "to cause the shots to rebound, and also of a series of beams "with double weds, the spaces between which are or may be "filled with compressed brushwood or other yielding material, "and the exterior of the beams is coated with a steel or other "plate."

It is proposed to construct a floating battery with beams of double-ribbed iron, and the sides and deck of plate iron. "The "sides are protected with three thicknesses of oak or other plank-"ing, and with any of the armour plates or shields hereafter "described. Instead of wood planking the armour plates may "be fixed to metal backing, or to the strong shell of the vessel, "which I prefer. The guns are mounted on deck, and are "covered by an arch formed of timber or metal and armour plates, "through which are port holes at intervals." The armour plates may be angular, with ribs to bear on the planking, and bolts to secure the whole together; or the plates may be angular, with flat sides for the intermediate angle plates, by which the joints are covered; or they may be angular at the exterior and flat on the inner side to bed on the iron backing; or they may be angular, and let partly into the iron backing; or lastly the plates may be corrugated, and have scarfed joints. The peculiarity in all these cases is that the outer surface is angulated or corrugated and that the armour plates rest on iron backing.

In a war vessel the lower part of the vessel is built of a double plating of iron divided into cellular compartments as usual, and the sides are of timber and iron, with armour plates of the improved description. The armour plates are of an angular form, put together in two thicknesses, so as to break joint, or they may *be made to overlap each* other like the scales of fish, and present

angular edges outside, or they may be the improved angular armour plates, with intermediate angle plates.

The gun boat proposed by the inventor is provided with two swivel frames or elongated rectilinear turrets on turntables. These turrets are narrower than the turntable, but extend considerably beyond it lengthwise. The ends of the turrets are formed of hinged doors, and each contains two guns, which "are partially "raised by hydraulic rams or other powerful agents to set the "frames to the required angle." The guns and the gunners, are protected by timber or iron covered with the improved armour plating. Or the gun boat may be provided with seven guns, two mounted on a frame as above described, and five on smaller swivel frames. Another gun boat and a floating battery are shewn, with variations in the nature of the corrugations in the armour. In the latter the gun is slung in a swing frame, consisting of a double nut in which two screws act, one right handed and the other left handed; by turning the nut round, the gun can be pointed to shoot out of any of the upper or lower port holes; the centre gun is also shewn slung in a frame supported on a turntable, which can be raised and lowered by a hydraulic ram.

The frame of the gun boat may be strengthened by lattice-work girders. The timbers in one example are angle shaped, and plain flat plates with bevel joints are secured to them. The joints of the plates are or may be further secured by tenons. These plates are made strong enough without iron backing. In other cases the armour plating consists of square plates with angular and rounded surfaces, and is secured together by bolts..

The frame of the vessel, as shown in the example, consists of an inner and outer casing connected by lattice work. The inner casing being small serves as a gangway through the boat, and the outer casing is protected by armour plating of any of the improved sections, The centre tower contains two guns, and the upper portion serves as a look-out house.

In a ship-of-war constructed according to these improvements; the ship is formed with an inner and outer shell connected by latticework, or by plate girders. "The decks are also supported "and the sides of the ship strengthened by lattice or plate girders; "these girders are sufficiently wide apart to form a passage for "transporting materials from one end of the ship to the other. "The space between the inner and outer shells of the ship is "enlarged for the purpose of affording space for the crew in

" case the vessel is boarded by an enemy, and also for the stowage " of ammunition." The sides of the ship can be protected by any of the methods before described, or the armour may consist of plates of convenient size for being lowered over the sides of the ship, and slung thereto by chains.

The inventor also describes iron guards for armour plates to reduce the force of the blow on the plates.

Drawings of other vessels are given with modifications of the above-named improvements. In one case the masts are made to lower down out of the way of shots by right and left-handed screws and strong nuts, these masts are pivotted at the deck.

In one of the vessels shown the armour plates are bolted through the side of the vessel, and the angles of the plates hold the wood blocks between the plates in their places; these wood blocks are strengthened by internal angle iron or double-ribbed iron bars. The armour plates do not come in contact at their edges, and should the projectile penetrate the outer packing, it will be stopped by the angle or ribbed plate below.

In a floating battery, constructed according to these improvements, the prow is strengthened with plate girders and beams of the improved construction, to resist the strain where the ram strikes. The ram bears against a charge of gun cotton or detonating powder, which explodes when the ram strikes, and the upper part of the vessel, which is protected by armour plating, i furnished with portholes for the cannon of the battery. The ram is below the water line, and three cannons are placed in the bows radiating towards the rams, so that when the ram strikes and makes a partial rupture, the projectiles from the guns, which are let off simultaneously, increase the same.

One of the improved floating batteries has a gun at the bows supported in a swing frame. The gun is held in position, when the battery is brought into action; as soon as the battery strikes the enemy's vessel, "the concussion liberates a catch, by which " the gun is held, and allows the muzzle of the gun to strike " forcibly against the vessel; the muzzle of the gun is bell-mouthed " to prevent injury to the bow of the barrel, the trigger catch " coming against the side of the vessel, discharges the gun at " the same time, thus uniting the blow of the gun in descending " with that of the projectile."

Certain coast batteries are also described.

For fences, walls, and ship sides which require ventilation, "I

" hinge a series of plates together, and I attach a connecting rod
" to each plate, which when acted upon by a lever or other power-
" ful agent will open and shut them at pleasure."

The improvements claimed by the inventor are as follows:—

"First, the use of rolled iron and steel of the various new " sections shown when used in the construction of bridges, roofs, " houses, and other structures, and the various modes of applying " double-headed and other railway bars in such structures."

"Secondly, in constructing lattice beams, girders, and other " structures of iron or steel with ribbed bars, I claim the cutting " away or indenting the ribs at the crossings to form abutments " for the purpose of relieving the strain on the rivets."

"Thirdly, in constructing lattice beams, girders, and other " structures, of flat bars of iron or steel, I claim the interlacing " of such bars for relieving the strain on the rivets and increasing " the lateral and tensile strength of the structure as described " and partly shown.

"Fourthly, the improved plate beams and girders, with lattice- " work or pilasters or ornamental work at one or both sides, as " described and partly shewn.

"Fifthly, the improved modes of constructing and erecting " bridges without the aid of centres or under scaffolding, as " described and partly shewn.

"Sixthly, the improved suspension bridge and the land ties for " the same, as described and partly shewn.

"Seventhly, in the construction of roofs, particularly applicable " for roofs of wide spans, I claim the compound suspension and " girder roofs, as described and partly shewn.

"Eighthly, the improved modes of securing the ends of the " suspension chains or wire ropes of suspension roofs, as " described and partly shewn.

"Ninthly, the improved modes of constructing the roofs of " polygonal buildings, as described and partly shewn.

"Tenthly, the use of sheet iron or other metal pressed into the " form of brickwork, stones, slates, tiles, or other forms used in " the construction of houses or other structures, as described and " partly shewn.

"Eleventhly, the improved compound beams and girders of " timber, as described and partly shewn.

"Twelfthly, the *improved* modes of constructing gates, fences, " *and other similar structures*, partly applicable to ventilating " *ships and houses, as* described and partly shewn.

"Thirteenthly, the improvements in the construction and "arrangement of gun boats, floating batteries, and other vessels, "as shewn and described.

"Fourteenthly, the various improved modes of constructing "armour plates for naval and defensive purposes, as described and "partly shewn.

"And lastly, the improvements in the construction of moveable "land batteries, as described and partly shewn."

[Printed, 2*l.* 13*s.* Drawings.]

A.D. 1862, March 25.—N° 820.

RENTON, AMHERST HAWKER, and COTTAM, EDWARD.—(*Provisional protection only.*)—"Improvements in apparatus for "steering ships." "Our improvements in apparatus for steering "ships relate to the apparatus for moving the rudder or rudders of "ships, and consist in applying the power to a tiller or other "lever (which is usually attached to the rudder head), by means "of a hydraulic cylinder and piston of a particular construction, "and also in actuating the same by means of pumps or cylinders, "and pistons driven or worked by steam or other agent as con"venience and circumstances may suggest, and this we effect "sometimes by employing manual labour, and at other times "the agency of steam or other motor to inject the water into the "main cylinder, the quantity of water so injected being regulated "by valves or cocks moved by the steersman with fitting and "suitable hand gear, and we further employ a weighted cylinder "and piston for the purpose of regulating the pressure of the "water and for producing when desired an instantaneous move"ment of the main cylinder or piston as the one or the other is "made moveable. In applying the hydraulic cylinder and piston "to the tiller, we prefer in most cases to fix the piston in a frame, "which we attach securely to the most convenient part of the "ship's stern and deck, and on which we cause the cylinder to "slide freely to and fro to suit the movement of the rudder, for "which purpose we make the piston rod hollow (the piston being "in the middle of the length) and introduce the water at each "end of it, so that the motion of the cylinder will be towards the "opposite end (of the cylinder) from which the water is permitted "to escape by opening a valve or cock, the water entering at the "opposite end by opening a similar valve or cock, which establishes "a communication with the regulating cylinder by an intermediate

" pipe, the motion being always proportional to the quantity " of water discharged from the main cylinder. In the event of " the water being retained in both ends of the cylinder by closing " the inlet and outlet valves or cocks at the same time, no motion " would ensue, but the rudder would remain locked in whatever " position it may have been placed, and by opening a valve or " cock, and permitting the water to escape from either end of the " cylinder, the movement of the tiller in the opposite direction " will be the consequence, and is checked only by closing the " valve or cock. At the same time that the water is permitted to " escape from one end of the cylinder the communication must " be opened between the regulator and the other end of the cylin- " der, so that the pressure of the water may be exerted simulta- " neously with the discharge, and in order to prevent any sudden " concussion upon the apparatus, the inlet valve or cock should " invariably be opened before the discharge valve or cock, so that " the pressure may be brought upon one end of the main cylinder " before the pressure is discharged from the other. The regulator " thus effects an instantaneous and uniform action of the rudder, " and we prefer that it should contain two to four charges of the " main cylinder in order that a succession of rapid movements of " the rudder may be made independently of the injecting pumps. " In some cases we entirely dispense with the ordinary injecting " pumps, except as auxiliary appendages, in which case we apply " the motive power directly to the regulator, which we construct " particularly for the purpose, either with a moveable cylinder or " piston, or cylinders or pistons. Either of these we move by " steam or other motor in a cylinder attached thereto, in such " manner that the pressure shall always, if necessary, be on the " regulator, so that when the inlet and outlet valves or cocks " communicating with the main cylinder are opened, the move- " ment of the main cylinder takes place." The regulators are placed beneath the surface of the water in which the ship floats, and near the boilers. Facility is thus given for the water to flow spontaneously into the regulator without any expenditure of power, as it will simply follow the retrograde motion of the one or the other of the pistons or cylinders, and will thus be charged ready for the return stroke, in fact performing the office of a steam pump. " Where it is desirable to retain the pressure on the " regulator and at *the same* time to avoid the consequent con- " *densation of the steam,* we cause the pipe of communication

" from the steam cylinder to the boiler to be connected with the " lower part instead of with the steam chest of the boiler, and " thereby permit water at the lowest temperature of the boiler " to enter the cylinder and to press upon the piston instead of " steam, the steam in the boiler exerting its force and elasticity " upon the surface of the water beneath it and through its agency " upon the piston of the regulator."

[Printed, 4d. No Drawings.]

A.D. 1862, March 28.—N° 866.

NOUALHIER, Eugene Théodore.—" An improved venti- " lator." The improved ventilator " is essentially composed of " two hollow and concentric cylinders of sheet iron or zinc. " These two cylinders are in their entire length separated from " each other by a small circular space, which leaves a free passage " for the air. The inner cylinder represents but the continua- " tion of the chimney flue; it terminates at about the middle of " the length of the exterior cylinder in which it is contained. " This latter is completely closed at the extremity which corres- " ponds with the lower extremity of the inner cylinder, and con- " trary to this, which is immovable, it will pivot with the greatest " facility around its congener when the slightest rotary motion is " given to it. Further, it presents on one of its faces a large " open throat, and upon its opposite face a species of wing which " forces this throat always opposite the wind."

" Supposing the apparatus above described to be placed on the " brick flue which terminates a chimney on the roof of a house, " the gentlest breeze acting on the wing causes the exterior " cylinder to oscillate on itself, and offer its throat to the wind, " which, once introduced, can only escape by the upper extremity " of this cylinder, the lower being completely closed. But in its " course it meets the point where the inner cylinder terminates, " and this being but the continuation of the chimney flue on which " it is fixed, the molecules of air placed at this point between the " two cylinders are urged to follow the ascent of the air which is " escaping by the outer cylinder. The molecules or particles of " air beneath these replace them, and a considerable draught is " the result of this application of one of the most simple physical " principles. My apparatus, used singly or doubly (one being " reversed or not), forms an admirable ventilator for ships."

[Printed, 10d. Drawing.]

A.D. 1862, March 31.—N° 888.

JORDAN, John.—(*Provisional protection only.*)—" Improve-
" ments in the construction of armour-plated vessels, or other
" like structures." The invention consists, firstly, " in the appli-
" cation of toughened cast-iron armour plates to armour-plated
" vessels or other like structures. The armour plates to be com-
" posed of a mixture of pig iron and malleable iron, melted
" together in such proportions as may be found advantageous, and
" afterwards properly annealed, and they may be case-hardened.
" The holes for the bolts may be cast or bored in or through the
" plates, or nuts of wrought iron may be bedded in the mould
" and the metal cast round them, and in this case it is preferred
" to form the nuts not so deep as the thickness of the plates, so
" that no holes shall be required through the plates; or the bolts
" may be screwed into the plates any required distance, but so as
" not to actually perforate the plates on the outside."

2. In the use of suitable cement placed between the joints of armour plates, and between the armour plates and wood backing, and also between and behind the wood backing, or in the place of the wood backing, so as to form a good foundation for the plates, and to fill up every defect of fitting; "a solid bedding
" is thus formed behind the armour plates and between the joints
" of the armour plates, and also between and behind the wood
" backing, and injury from oxydation or corrosion to the ship's
" side and armour plates and plate fastenings by the water getting
" behind and between the plates will be prevented."

" The cement proposed to be used may be composed of (say)
" clean river sand, Portland cement, Roman cement, or powdered
" porcelain, clay, and quick lime mixed into a mortar-like con-
" sistency with well boiled linseed oil and litharge, linseed oil,
" and Japan size or shellac varnish."

[Printed, 4*d*. No Drawings.]

A.D. 1862, March 31.—N° 893.

WOODBURY, Joseph Page.—" An improvement in arming
" war vessels." The invention consists, firstly, " in providing a
" hull of good model for speed with a shallow draft of water,
" and of a capacity to carry coals, and machinery sufficient to
" excel in speed any vessel designed to be attacked."

2. " *In providing means for* sinking it to the deck by water ballast
" *when going into action*, so as to expose the smallest possible

"part of the ship to an enemy's fire, which part only would "require to be plated with thick iron to protect it from shot."

3. "In making the deck convex or circular, both longitudinally "and transversely, so that when the vessel is submerged to a "fighting trim the sides of the deck will be below water, and the "surface exposed will be presented to an enemy's shot at a low "angle, and also that the centre of the deck will be sufficiently "above water to enable the vessel to be worked in a sea way."

4. "In forming in the middle of the deck a low oblong trunk "projecting upward a short distance from the deck, and plated so "as to be secure from shot, through the sides of which small "holes are made for the purpose of observation externally, and "for the purpose of defending the deck by musketry, by ejecting "hot water, or by any other means. These holes are flared upon "the inside to permit a wider range of observation and attack, "after the manner of a loophole for musketry in fortification. "The top of the trunk is provided with several large openings "thoroughly secured by shot-proof gratings, through one of "which the smoke from the boiler emerges, and through the "others the hold is ventilated by fan blowers or otherwise. The "steering wheel is also placed within it, and from within it all the "movements of the vessel are directed."

5. "For the purpose of attack the vessel is provided with, say, "three or more breech-loading cannon of large calibre, which are "mounted one at the bow, ranging fore and aft, and one on "either side, ranging athwart ship, the muzzles of which extend "through the sides of the hull at a considerable distance (say, "ten feet, more or less) under water, and are provided with many "accessory devices," "to enable the guns to be worked under "such conditions. They are designed to carry a large hollow "oblong projectile or shell, containing a great bursting charge, "which is to be thrown into the hull of the vessel to be attacked, "and there exploded by fuse. The guns are made to work in "stuffing boxes in the side of the hull, and have a movement "only in a longitudinal direction, and are not designed to be "aimed as they are intended to be used only when near the object "to be assailed."

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1862, April 4.—N° 965.

SCEALES, JAFFRAY.—(*Provisional protection only*.)—"Im-"provements in steering ships." The invention is intended

chiefly to apply "to the steering of ships of great length, and
"consists in fitting one or more rudders on the sides of the vessel
"in addition to the ordinary rudder. The additional rudder or
"rudders when not at work enter a recess or recesses formed in
"the ship's side to receive them, in order that there shall be no
"projecting surface to interfere with the ship's way when the
"additional rudder or rudders is or are not in action."

[Printed, 4d. No Drawings.]

A.D. 1862, April 7.—N° 982.

SIMONS, WILLIAM.—"Improvements in constructing ships or "vessels." The invention relates to the constructing of ships or vessels with iron frames, combined with external wood planking, and comprises improvements designed to render this system of construction more satisfactory than hitherto.

It consists, firstly, in fastening the wooden planks to the iron frames by means of screw bolts or other bolts made of iron or steel, and partly covered with copper, yellow metal, brass, zinc, or any combination of these metals. It is preferred to use a screw bolt of iron or steel, fitted with an iron or steel nut, the copper or other covering being applied to the head of the bolt and to as much of the shank or body as is embedded in the plank, whilst the part passing through the frame and nut are not so covered. Bolts of the same kind may also be used to secure the deck planking to the beams.

2. In introducing between the iron frames and the external wood planking, flat bars or plates of iron or other metal, each bar or plate being disposed diagonally from about the gunwale down to the keel, or down to the bilge only, and rivetted or otherwise fastened upon the outsides of the frames. In combination with these diagonal bars or plates similar bars or plates may be rivetted to the insides of the frames, or to the reverse angle irons attached to the frames, being disposed in reverse diagonal directions to the bars.

3. In fastening or binding to each other the outside wooden planking of iron-framed ships, by means of diagonal or oblique seam bolts, such bolts being driven in edgeways in a vertical plane, or in a plane parallel to the face of the planks, and across the seams of two or more layers or ranges of planks.

[Printed, 10d. Drawing.]

A.D. 1862, April 8.—N° 991.

BROWN, James.—"Improvements in protecting the bottoms "and sides of ships and other entirely or partially submerged "surfaces."

The invention consists "in protecting the bottoms and sides of "ships and other entirely or partially submerged surfaces with "plates or sheets of iron which have been previously coated or "covered with an enamel or glaze, either on one or both sides, "such glazed or enamelled plates being caused to adhere to the "sides and other portions of the vessel desired to be protected "by means of a suitable cement, such as glue or other adhesive "material or mixtures." The plates may also be attached by nails, screws, rivets, or other suitable means.

[Printed, 4*d*. No Drawings.]

A.D. 1862, April 8.—N° 992.

BEARDMORE, William.—(*Provisional protection only*).—"Improvements in steam rams for naval purposes." "The steam "ram consists of an iron-plated vessel, which is actuated by "steam power in the ordinary way. This vessel has fitted in it "one or more steam rams, which may be arranged at the bow or "stern or along the sides." Each of these rams consists of "a "powerful horizontal rod which forms a long sharp-pointed ram "for perforating the sides of any enemy's ship or floating "battery. These rods are intended to be made very heavy, and "to be driven outwards by one or more engines, a sufficient "amount of velocity or impetus being given to them either by "means of large fly wheels, by gearing, or" in "any other con- "venient manner. With these rams vessels constructed with "shot-proof sides may run close alongside an enemy's ship or "floating battery, and by means of the powerful horizontal rods "forced against the sides, quickly shatter the armour plates or "sides of the opposing vessel to pieces and sink her."

[Printed, 4*d*. No Drawings.]

A.D. 1862, April 8.—N° 995.

FITZ MAURICE, William Edward.—(*Provisional protection only.*)—"An improved construction of plating for ships' batteries "*and other structures* used for war or other purposes." The

invention consists "in plating ships, batteries, and other struc-
" tures in such a way that water is introduced and confined
" between two plates, thus forming a part of the resisting
" material against shot, shells, or any other projectile force in
" contradistinction to using solid plates of iron, steel, or other
" materials. For this purpose I use cases of iron, steel, or other
" material filled with water, and so contrived as to be capable of
" being by any convenient arrangement emptied or refilled at
" pleasure."

[Printed, 4d. No Drawings.]

A.D. 1862, April 8.—N° 1004.

WRIGHT, James.—" Improvements in joining together armour
" and other thick metal plates, beams, and girders." "I slot,
" plane, or in any convenient way make one or more 'dovetails'
" in the materials to be operated upon, the oblique sides of which
" are also oblique to the surface, that is to say, the two opposite
" sides of each dovetail are to be oblique to the end or side, and
" also oblique to the two surfaces of the plate girder or beam.
" This obliquity of the sides or the dovetails to the surfaces is
" a little more in one plate or half beam or half girder than the
" other, so as to" allow " of a taper key to be forced or driven in
" between those two pairs of oblique sides of the dovetail, and
" thus by means of" these " keys draw and bind the plates or com-
" ponent parts of the beam or girder together. In beams the
" obliquity might be dispensed with" and rivets or screws used to
form the dovetail.

[Printed, 4d. No Drawings.]

A.D. 1862, April 9.—N° 1013.

JONES, Josiah, junior. — "Improvements in constructing
" and arming ships and vessels." In order that the power of steam may be employed when alongside of an enemy's ship to make a hole therein below the water, provision is made in constructing a ship or vessel, and applying steam machinery thereto, for employing what may be termed a steam battering ram adapted to produce the effect above mentioned. For this purpose at the bow or other part or parts of a ship or vessel suitably constructed to resist projectiles, and be propelled with so much speed as may

be, "a ram is or rams are applied; each ram consists of a shaft or "bar capable of sliding water tight to and fro through the "bow or other part of the ship or vessel. The inner end of "this bar or shaft is in connection with the piston of a steam "cylinder, so as to be worked by steam quickly to and fro in a "similar manner to a steam hammer. If desired the ram may be "made hollow, so as to admit of a shell being passed through it "into the enemy's ship. In order that a ship may be enabled to "fire a projectile through the bottom of an enemy's ship below the "water, when attempting to run an enemy down or otherwise to "come against her, the bow or part of the bow of the vessel is so "made that it may pass to some extent under the enemy's ship "or vessel, and from this part of the bow an inclined passage "rises to a position above the level of the water so that a suitable "gun or piece of ordnance may, when loaded, be lowered down "so as to come under the enemy's ship, and in contact therewith "or nearly so, and then fire its charge into or through the "enemy's ship. In some cases the bow is at a point somewhat "below the water, made very strong and with a hollow passage "through it to admit of a gun or piece of ordnance being fired "along the passage and through the side of an enemy's ship or "vessel immediately on the bow striking the enemy's ship, so "that if the damage consequent on the collision is not sufficient "to sink the enemy the discharge of the gun or piece of ordnance "may effectually accomplish this end."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1862, April 10.—Nº 1033.

BURGE, George.—"An improved means of protecting forts, "ships, and other structures and places against projectiles and "other striking bodies." Instead of the blow of the projected or striking body being resisted by or received on a fixed surface of masonry, brickwork, or other material, the inventor employs, for the purpose of effecting the object of the invention, a moveable body or shield, "that is to say, a body capable of receding, "retiring, or recoiling, or of moving backward or inward when "struck with sufficient force, and which may also, if desirable, be "so arranged that after having been so moved it shall be returned "or restored to its previous position by balance weights or other "*contrivances*; and I apply this shield to the ship, fort, or other

" structure or place (to be protected) in such wise that it shall
" present an outward face, front, or surface of iron, or other metal
" or material, to resist or receive the blow of the projectile or
" striking body. The shield may, if desirable, be constructed
" hollow, and be filled or loaded with iron or other material.
" Any required number of shields may be employed."

[Printed, 4d. No Drawings.]

A.D. 1862, April 10.—N° 1035.

REYNOLDS, OSBORNE.—(*Provisional protection only.*)—" Im-
" provements in building ships and other vessels."

In constructing the lower parts of a ship or vessel, for the purposes of this invention, wedge-formed timber is used, the thinner edge of the wedge being inwards and the thicker edge outwards; " between each strake of these wedge-formed timbers there are " plates of iron or steel as wide as the wedges or filling pieces of " timber. The wedges and the plates of iron both run in a " direction fore and aft of the ship or vessel, and by reason of the " filling pieces of timber being wedge-shaped, the requisite " curved form for the bottom of a ship or vessel is obtained; " through these wedge-formed timbers, and through the plates of " iron or steel between them, screw-bolts are passed, and the " whole strongly screwed together. The walls of a ship or vessel " are similarly constructed, the timber being made with parallel " sides or wedge shaped, according as the form of the ship or " vessel may require. The plates of iron or steel between the " horizontal layers of timber used in forming the sides of a ship " or vessel from " some " distance below the water line upwards are " formed with thick massive outer edges which overlap the filling " pieces of wood, and form the outer surface or skin of a ship or " vessel, in order that the outer surface of a ship or vessel may be " capable of resisting shot and other projectiles, and also in order " to make the body of the ship or vessel of great strength. The " layers of wood and the plates of iron or steel used in forming " the sides of a ship are perforated to receive upright screw-bolts " to screw or compress the whole of the layers together at proper " intervals."

[Printed, 4d. No Drawings.]

A.D. 1862 April 11.—N° 1050.

BUSH, *WILLIAM.*—(*Provisional protection only.*)—" Improve-
" *ments in the construction* of ships and shields." The invention

consists in constructing the sides of the ships of two thicknesses of iron or steel, in running between the two plates molten metal from a little below the load water line upwards, and in filling up the space between the two plates, from the keel upwards, to such points as may have been filled in with molten metal with bitumen, pitch, marine glue, or any other like substance, which may be run in hot, and which will solidify on cooling. These double plates may be applied to existing ships as well as in the construction of new ships.

The improvement in shields consists in "constructing them " with a floor free to revolve, upon which the gun or guns is or " are mounted, and with a roof in the shape of a segment of a " circle."

The roof is supported by iron columns and is stationary. The protection for the gun or guns and men working the same, in addition to that afforded by the roof, is formed of a ring or rings of thick wrought-iron plates, or of double plates with molten metal run into the space between them. In the rings port holes are provided for ordnance, as well as loop holes for small arms. The whole of the parts, excepting the roof, move together when they are made to revolve.

[Printed, 4d. No Drawings.]

A.D. 1862, April 16.—N° 1104.

WARREN, Frederic Pelham.—" Improvements in apparatus " for steering sea-going vessels." The object of the invention is to enable sea-going vessels to be steered with greater accuracy and facility than at present, and also where two rudders are used, to afford independent means of steering the vessel in the event of accident to the ordinary rudder; otherwise in some cases it may be found advisable to construct vessels with only one steering apparatus, situated and arranged as follows :—

A metallic or other rudder is situated "at the forward part of " the vessel, in some cases placed in a recess or opening formed " in the forward 'dead wood' or equivalent metal of the vessel, " in others carried by a false stem additional to and projecting in " front of the real one, the rod, pintles, or other axis or axes upon " or about which the rudder turns being in each case situated at " the forward side of the rudder itself. A rudder situated and " hung as described has the advantage of meeting and being " acted upon directly by the solid water opposed to the forward " motion of the vessel instead of acting only against the inferior

" resistance offered by the more or less broken water at or about " the stern." The rudder so situated is, moreover, in a great measure protected from injury from the effects of shot or shell, running aground, or other casualties to which the ordinary rudder is especially liable.

[Printed 10*d*. Drawing.]

A.D. 1862, April 19.—N° 1150.

LUMLEY, HENRY.—" An improved rudder." " I construct a " *rudder* in two moveable portions, connected together edgewise, " the outer or further portion, which I call the 'tail,' being at the " outer end of the inner or hither portion, which I call the 'body.' " The two portions are hinged, jointed, or articulated together, " so that when the body is moved, turned, or worked to steer the " ship or vessel, the tail also turns or works at the end of the " body, and assumes various angles with respect thereto," thus presenting a recessed surface to the water.

The "tail" of the improved rudder is guided or controlled by means of two chains or ropes passing through oblique slots or orifices in the "body" portion of the rudder, each chain or rope being attached at one end to a fixed point on the stern post or hull of the vessel, and at the other end to a fixed point on the " tail."

[Printed, 8*d*. Drawing.]

A.D. 1862, April 21.—N° 1153.

MONCKTON, EDWARD HENRY CRADOCK.—" Improvements " in the preparation of metal to be used in the construction of " cannon, rifles, armour plates, and other objects used in naval " or military warfare or otherwise." The invention consists, first, in the employment of iron and steel made from iron sand and its matrix, and in improvements in common iron and steel; and, secondly, in the application of electricity in connexion with these improvements, and in other ways. " I employ electricity " however generated by any of the usual means, and with or " without the use of coils of induction, and of condensers of " electricity, the electric current being varied in quantity or " intensity, or in both, as follows; for example, I unite " *together pieces of metal* or wire by electrical deposition; thus

"in the construction of cannon the deposition of metals or their "alloys can be made on cores prepared in various ways, thus, "one method is to make a tube of metal, such as tempered steel, "iron, brass, bronze, or other suitable metal or alloy, smooth or "rifled in its bore, prepared in the ordinary way, on which metal "rings, wire, pieces of metal, which if made of steel could first "be tempered, or other metallic preparations, either previously "coated with metal or plumbago to prevent oxydation, or other-"wise, can be united and secured by electro-deposition; thus "also improved armour or other defensive metallic plates may "be prepared, either hard or soft, by adopting the same methods; "for example, a common but good soft iron plate may be used as "o base for depositing pure hard iron or any other suitable metal "upon, or pieces of steel, tempered or otherwise, or other metal "may be united to this base, and the process may be varied in "many ways, to answer particular purposes, as for rendering the "sheathing plates, bolts, and fastenings in iron ships of war or "otherwise less liable to destruction, owing to the less oxidizible "nature, greater purity and hardness, if so desired, of the metal "or alloy deposited outside; thus brass applied to iron plates "would protect them from corrosion, from sea water, and from "marine insects, &c.

"I employ electricity in a furnace of peculiar construction for "cementing and wholly or partially converting into steel iron "used for ships of war, &c."

"I also use the solution of asbestos and mica with alkaline "carbonates and caustic alkalies for preserving the metal of "ships, cannon, armour plates, and metal generally, forming "the subject of this patent, from corrosion and marine deposits. "The solution is to be applied cold to the metal, which is then "to be heated up to a red heat and cooled; cannon thus protected "may be fired with rapidity without fear of injury from heat."

"I further use metal prepared as above described together with "electricity for purposes of protection and of defence in war and "on board ship, by the use either of simple electricity, however "generated, or of electricity strongly induced, intensified, and "condensed by means of powerful galvanic batteries, or magneto-"electric machines in connection with gigantic induction coils and "electrical condensers; this is effected by conveying from one "position to another, between which an enemy must pass, wires, "*bars, rods, chains,* sheets, or blocks of any conducting metal,

" prepared by preference by the above processes, and united to " the poles of the batteries in connection with gigantic induction " coils and condensers, or with the poles of magneto-electric " machines with similar arrangements used either with properly " insulated pillars or supports in the form of a fence, or else " placed upon the surface of the ground, from which these are " insulated by sheets of gutta-percha, glazed tiles, shellac, " resins, prepared silk, or other suitable non-conductors; the " moment any one of these wires or pieces of metal" is " touched the shock will be received and no protections of " gloves, cloth, soles of shoes, or other covering, even though " they may be of gutta-percha, are of any avail. It is obvious " that contact between these pre-arranged wires, &c., with the " poles of the battery need only be made when required; thus " the defenders having retired and the enemy having rushed in, " contact could be made, when the latter would be caught in a " trap or be prevented from nearer approach at option."

" In applying metal prepared as before described to the building " of vessels of war, military, and other transports, and ships of " large tonnage generally in the following novel method: I firstly " prepare one or more long tunnels or tubes capable of self- " support if suspended in the air by their ends, constructed on " the principle of the 'Britannia' bridge; these constitute the " centre backbone or keel of the ship reversed. I then make " another tubular vessel pointed at each end, representing the " shape of the ship, flat both at the top and at the bottom, with " its outer sides corresponding in shape to the sides of the vessel; " the first oblong tunnel is then so built into the centre of this " last tunnel or tube that its section at any part forms with it " three parts of a cross. A good proportion for the first tube is " twenty-five feet by twelve feet and a half, and one thousand " feet long. The second tube is to be one thousand feet long, " and eighty feet broad, and ten feet deep, tapering towards the " extremities, each end having similar wave lines and furnished " with a rudder also at each end. The second tube is to be sub- " divided longitudinally and across into about forty different " water-tight compartments; the sides of the vessel must be " double, and her bottom may be so also, if necessary built in " honeycombs, a good proportion being five feet and a half " between the walls, the sides rising the same height as the " interior tunnel or tunnels, *i.e.*, twenty-five feet. The vessel " would of course be braced strongly together, which is done

" already in many ways. For purposes of transport the inner " tunnel or tunnels could be arranged with rails so as to run " trains laden with military stores and soldiers quickly into; a " vessel so constructed need not draw more than six or seven feet " of water, if so much, could carry any amount of armour plates, " soldiers enough to constitute a little army, numerous cannon of " any magnitude, would have six, eight, or more steam engines to " propel her, could from her small draught make her way in very " shallow water, and from her speed of about twenty-five knots " per hour be able to overtake or run down any vessel. Though " from both ends being alike there would be no necessity for " turning her, yet from having two rudders and several engines, " some of which could be applied to turn and some to propel her, " she could be made to turn, if required, in a very small space " as rapidly as a vessel much smaller. On entering her port she " would merely steam in and back out at pleasure. It is obvious " that her length would prevent pitching, and her great width, " flat bottom, and immense speed almost obviate rolling, as she " would be away from one wave to another before much rolling " could take place, so that not only could the gunners take a " steady aim, but the soldiers on board would not be sea-sick " and thus be fit for work the moment they arrived. Her im-" mense tonnage would enable her to carry an enormous quantity " of coal and military stores, she would resemble a moveable fort " in the water. The same build could also be applied to mer-" chant vessels and transports for railway trains. Ships built " of the superior metal I propose to introduce prepared" as described "from iron sand could be made lighter and stronger " than ordinary ones.

" I further use my steel tempered in the formation of electric " shell or shot for cannon. These shot are made hollow and " filled with condensers of electricity, the shot as it passes from " the mouth of the cannon touches wires from a powerful " battery, and conveys the electricity through the air till it strikes, " when contact takes place and the discharge is effected with " the same terrible effect as a discharge of lightning."

[Printed, 6*d*. No Drawings.]

A.D. 1862, April 21.—N° 1156.

GRIFFIN, Sandiforth Featherstone.—(*Provisional protection only.*)—" *Improvements* in the construction of vessels of war

" and batteries on land." It is proposed to construct a cylindrical shaped framework, containing in a suitable position a gun platform. The upper part of this framework will be dome-shaped, and protected by armour plates of iron or other metal; the lower part may be carried deep into the vessel, and divided into compartments as depôts for shot and other munitions of war. This framework is suspended by trunnions on a circular ring, and such ring is again suspended by trunnions, similar in principle to the suspension of a ship's binnacle, on a second ring, resting on the framework of the vessel, with intervening rollers admitting of the easy rotation of the framework, with its gun platform and rings, by any suitable gearing. By these arrangements, or by the adoption of the cup and ball system of suspension, the inventor expects to keep the platform or platforms parallel with the water independently of the ship's motion, and to neutralize to a considerable extent the effect of the recoil of the guns and the impact of shot. "The entire outer casing of the gun platform may be " lifted up and lowered by steam power, or screw power, or other " means, so that a gun or guns may be loaded from below or " while below deck line, and the platform elevated and gun " pointed and discharged above the line, or, so to speak, on deck."

" For the better securing of the framework, and for other similar " uses, I propose to use a peculiar nut fastening to secure the " bolts." " The nut being screwed tight on the bolt end, I drive " a metal pin into the plate against the disc of the nut, or into a " groove cut in the outer edge of a circular recess, into which the " nut when tightened up is partially recessed. By these means I " expect to prevent the nuts and bolts employed in fixing armour " plates, or for other similar uses, from working loose."

[Printed, 4*d*. No Drawings.]

A.D. 1862, April 22.—N° 1171.

WARNER, ARTHUR.—" Improvements in the construction of " vessels of war, and in floating or other batteries," " whereby " such structures are rendered less liable to injury from the effects " of shot or shell of an enemy."

" In constructing a vessel of war, or a floating or other battery, " I prefer to form the outer skin of a plate or plates of iron of " sufficient thickness to resist the action of ordinary shot or shell, " and between *this outer metal* skin and the planking or timbers

"of the ship or battery, I form chambers or cells by the arrange-"ment of the metal or timbers which support or form the outer "skin, and these chambers or cells I afterwards fill up with "molten metal, or with other materials cemented together so as "to form a solid and compact mass. These materials may con-"sist of any of the various cements, such as are well known, "or sand or other earthy or hard granulated matters, between the "interstices of which any suitable cement or adhesive material "may be introduced, or a coarse description of paper pulp or "other suitable material capable of solidifying or forming a com-"pact mass may be employed for this purpose."

[Printed, 4d. No Drawings.]

A.D. 1862, April 24.—N° 1194.

BOND, John.—"Certain improvements in projectiles, which "improvements are applicable to horns attached to vessels for "war purposes." The projectile is cylindrical and elongated, and the forward end is recessed to receive a charge of fulminating or other exploding powder, and a plug, either with a percussion cap or not. The body of metal round the recess forms a punch, which penetrates with facility the armour plates or other body against which the projectile strikes, and when the projectile has penetrated to a certain depth, which can be regulated by the shape and arrangement of the plug, the projectile explodes and enlarges the hole. In using the projectile for smooth-bored fire-arms and ordnance a taper plug with diagonal grooves is employed to close the recess; a plug is required for projectiles used for rifle barrels, but without the diagonal grooves.

In applying the improvements to the horns of vessels for war purposes, the exterior plug may be dispensed with, and the recess containing the charge must be hermetically closed in any convenient manner.

[Printed, 8d. Drawing.]

A.D. 1862, April 30.—N° 1272.

LEIGH, Evan.—(*Provisional protection only.*)—"Improvements "in the construction of ships and floating batteries, in mounting "their guns, and in the application of steam power, parts of "which improvements are also applicable to land batteries and "forts." "I make the paddle-wheel propellers work between

" pontoons astern, the said propellers being made with shrouds " and buckets similar to a water wheel; the buckets being air-" tight or partially so, the edge of each float being set a little " zigzag. When they enter the water the air within them is " compressed, and serves to keep the water towards the periphery " of the floats. As the floats leave the water the air rushes out " and pushes the water away from them, the recoil acting in the " direction of propulsion. In other respects the paddles are " detached and acted upon for steering purposes if required.

" In floating batteries for destroying other ships I employ a " steam cylinder of about 60 inches diameter, with 10-feet stroke, " having a strong piston rod about 20 inches diameter working " through a stuffing box below the water line. The said piston " rod, which passes through both ends of the cylinder, is pointed " at the end with hardened steel, and weighs, with its piston, " about 20 tons. The action and arrangement of the cylinder " is precisely similar to the well-known steam hammer, which " admits steam alternately at each side of the piston, so that the " ram or tap can be made to strike an enemy's ship a prodigious " blow on coming alongside, and repeat the same in rapid suc-" cession if necessary. The force of the blow may amount to " 100 or 1,000 tons, being limited only by the size of the cylinder " pressure of steam and will of the operator.

" In mounting ships' guns I balance two guns at the end of a " lever, which works on a pivot. The said guns, when at rest, " are below the port-holes or parapets, and lie in a horizontal " position out of reach of the enemy's fire. When one is re-" quired to be discharged the lever is tilted like a weigh-beam, " which lifts the gun above the parapet or port-hole, when it is " easily adjusted or sighted by a screw. After being discharged " it is lowered to the horizontal or safe position again, and swung " round to a convenient position for re-loading. By these means " the heaviest guns can be easily moved about in any direction, " and shotted with safety and rapidity, the recoil being taken up " by india-rubber or other elastic springs placed behind the steps " of the trunnions."

[Printed, 4d. No Drawings.]

A.D. 1862, May 2.—N° 1303.

WELCH, Henry.—(*Provisional protection only.*)—" Improve-" ments in securing or attaching armour plates on or to ships or

" vessels." This invention relates, first, to an improved mode of constructing the hull of the vessel, so that the plates may be more firmly secured to the sides than by the ordinary mode, and without the use of bolts, screws, or other fastenings, which render it necessary to pierce the plates with holes. To this end the hull or shell of the ship or vessel is constructed of iron, and the side plates or skin of the vessel at that part which is intended to be protected by armour is constructed in such a manner, that spaces are left between the plates which form the shell. The edges of these plates are bevilled inwards so as to form a kind of dovetailed joint.

And, secondly, to the mode of securing the armour plates to the shell of the ship, and also to the contiguous plates, so as to form a continuous and unbroken skin of armour. In order to effect this object a dovetail groove, corresponding to that in the shell of the vessel, is planed out of the back of the armour plate, so that when the latter is bent to the proper curve, and is brought to its place on the ship's side, the two dovetails will be coincident. An alloy of copper, in a molten state, and somewhat resembling gun metal, is then poured into the double dovetailed groove, and will firmly hold the armour plate on the ship's side.

" In order to secure two contiguous plates together by their " edges, dovetailed grooves are planed out of the edges of the " contiguous plates, and when the two plates are brought to- " gether the double groove is filled up with the molten copper " alloy, and thus a secure joint is produced. Should a projectile " succeed in piercing the armour covering, the hole may be re- " paired by means of a plug of wrought iron, which must be " inserted into the hole and secured therein by running the alloy " round it; of course, if the hole be jagged, the alloy will fill up " all the interstices, and will make the plate nearly as secure as " before."

[Printed, 4*d*. No Drawings,]

A.D. 1862, May 5.—N° 1329.

WILSON, Thomas.—" Improvements in the manufacture of " armour plates for ships of war and batteries, and in fastening or " securing armour plates to ships of war and batteries." " I make " the said plates either of wrought iron, or steel, or of copper, or " of gun metal, or other metal or metallic alloy." " In making the

" said plates of iron or steel, I form ribs or flanges on their sur-" faces, the said ribs or flanges serving to attach or secure the said " plates to the ship or battery." These ribs or flanges may either be made on the plates by rolling or forging during the manufacture of the plates, or they may afterwards be attached to the plates by welding or brazing, or they may be made on the plates by taking flat plates, and bending the edges or portions of the edges of the plate into planes at right angles to the plane of the plate. " Where two layers or rows of armour plates are employed I make " the armour plates of the first or under layer with a strong " longitudinal central rib," expanding or overhanging at the top on either side. When the plates are fixed side by side the ribs form channels or grooves, in which the outer layer of plates can be inserted by a sliding motion. The under layer are secured to the side of the ship or battery by means of strong wood screws, the heads of which are let in flush with the plates. When the outer plates are slid or forced into the grooves formed by the central ribs on the first or under layer, they cover the heads of the wood screws and protect them from injury. For further securing the under layer of plates, through bolts may be passed through the central ribs, and secured by nuts on the inner side of the ship or battery. In fastening or securing two layers of plates, the ribs formed on the under layer of plates may be separate from the under plates, and the ribs may be fixed by through bolts and nuts. By making the ribs separate from the under layer of plates, the outer layer of plates may be readily removed in case of injury, and replaced by others.

Or, " I fasten or secure the said plates by means of bolts or " fastenings, made larger in diameter at their screwed ends than " at their middle, the object being to transfer vibration to the " middle or plain part of the bolt, and thereby to secure the " screwed ends of the bolt from injury."

To protect the said bolts still more effectually from injury by vibration, " I wrap the middle or stem of the bolt with tarred " hemp or other soft fibrous material, and I place strips or " washers " of india-rubber under the metal washers or skin plates on the inside of the vessel or battery. The bolts are screwed into the ribs of the armour plates at one end, and are fixed by screw nuts on the inside of the vessel or battery.

In fastening or securing armour plates having no ribs, the bolts are made with hook or crutch heads, and " I mortice or let in the

"said heads flush with the edges of the plates," thus covering or protecting the heads of the bolts without perforating and weakening the armour plates; or in place of the crutch-headed fastenings hook-like fastenings may be employed. These hook fastenings may be made of either round or flat bar iron. When they are of round iron, a series of holes are drilled near the edges of the plate, passing obliquely from the back to the edge of the plate. These holes are drilled in pairs to receive the ends of loops or staples of wrought iron, which loops are passed through the holes in the plates, having been first heated to redness and passed through eye bolts in the side of the ship or battery. The ends of the heated staples are rivetted on the edges of the plates, the holes being countersunk at the top for receiving the rivet head. The eye bolts referred to pass through the side of the ship or battery, and are secured by screw nuts on their screwed ends. Iron plates or washers, and india-rubber washers, are placed under each nut, to reduce or neutralize the effect of the vibration of the plates on the bolts under the shock of heavy projectiles.

When the hook fastenings are of flat bar iron, small bars are bent near their middle at right angles, and inserted in recesses made in the edge of the plate and brazed to the plate. Holes are made in the projecting parts of the bars, through which holes eye bolts or fastenings are passed, with which the armour plate is connected with the ship or battery.

By this method of fastening the armour plate to the ship or battery, " the armour plates are not weakened by perforations, " and the jarring of the bolts is obviated by the loop connections, " which allow the plates to vibrate or bend without stripping or " injuring the screwed eye bolts; each plate is also independent " of the others, and can be readily removed and replaced when " damaged. The hook fastenings described are not so liable to " injury by percussion as fastenings of more rigid construction."

[Printed, 1s. 4d. Drawings.]

A.D. 1862, May 5.—N° 1336. (* *)

BUSHBY, Robert.—(*Provisional protection only.*)—" An im- " proved method of lifting or lightening ships for entering " shallow harbours, or docking and other purposes."

The Specification of this invention is of considerable length,

but the leading features of the invention will be sufficiently understood from the following abstract thereof.

"Observing that there may be great difficulty in docking the "Warrior, and other ships of her large draught of water in con-"sequence of there not being docks to obtain water of sufficient "depth to float ships of her large draught into them in many of "the ports of the United Kingdom it has occurred to me that a "power might be applied to bring up the ships, or lift them up "sufficiently out of the water to enable them to enter some of "the present docks without alteration, and also to take ships of "larger draught into shallower harbours in cases of emergency. "To accomplish this I should propose to apply either of the fol-"lowing powers, namely, to form iron tanks or buoys of sufficient "buoyancy for each side of the ship, with a chain to pass under "the ship, and through the buoys or tanks, by forming a water-"tight trunk through them to admit the chain. I should then "propose to immerse the tanks, by admitting water into them to "bring them down to nearly the weight of the water, by having "a water-tight compartment. The water could be admitted by "a screw-down valve, and when sufficiently full screw down the "valve, take in the slack of the chain, and make it fast, or if "thought more desirable, the chains of the buoys could pass "under the ship and fasten with shackles on deck, or in any "other mode thought desirable, and then apply a pump to pump "out the water, this might be done by a hose, with a brass union "to connect to an iron pipe, which should be made and fixed to "each tank and then leading the hose or suction pipe to a small "steam engine, or any other power for pumping out the water; "there must be a small air pipe to each tank." "These tanks or "buoys could be made to suit the dimensions of the docks, and "the power used for applying them; they could be made small "enough to be bousted down with luff-tackles, in a man of war "having plenty of men." "This power could be used for many "other purposes, namely, for raising sunken ships or raising ships "for bar or shallow harbours." "This mode applied to lighten-"ing or raising a ship could also be carried into effect by having "a steam boat with a tank or water-tight compartment, and to "immerse the steam boat by admitting water, as before proposed, "with a screw-down valve. I should then propose to have a "series of chains to go down through the centre of each steam "boat by having a water-tight trunk from the centre of the keel

"to the deck, (or in any other direction that gravitation may "direct), with friction rollers top and bottom. The chains to be "laid from the deck of one steam boat, under the bottom of the "ship to be lightened, and raised up thro' the other steam boat, "leading to the deck, and when the boat is immersed the slack "of the chain to be taken in and made fast. There could be "almost any amount of power obtained by adopting the power "of the screw-jack," "and as the latter mode would not interfere "with the capacity of the steam boat, it might be thought pos- "sibly more desirable. Two steam boats, with chains slung in "this way, could run alongside of a ship, with the chains drop- "ping under the ship, the boats made fast fore and aft to the "ship to be lifted."

The inventor mentions five different "powers" as being applicable in carrying out the invention, viz.:—"1st, by luff tackles; "2nd, by admitting water and pumping out; 3rd, multiplying "pinion wheel; 4th, hydraulic pressure; 5th, the powerful screw." These "powers" may be "worked by steam or not, according to "circumstances."

[Printed, 4*d*. No Drawings.]

A.D. 1862, May 6.—Nº 1346.

BORTHWICK, George. — (*Provisional protection only.*)— "Certain improvements in the construction of ships, boats, and "rafts." These improvements consist "in building or forming "the deck and other superstructure of the ship, boat, or raft "upon two or more pontoons or water-tight cylinders placed "parallel to each other, one pontoon constituting the support of "each side of the ship, boat, or raft. The pontoons are to be "firmly stayed inside, and connected and bound together on the "outside, and are to support the superstructure of the vessel "above the surface of the water."

[Printed, 4*d*. No Drawings.]

A.D. 1862, May 7.—Nº 1370.

HALEY, Joseph.—(*Provisional protection only.*)—"Improve- "ments in armour plates for ships, boats, and batteries." The invention consists "in applying to the exposed parts of ships, "boats, and batteries, plates and bars of iron, steel, or other "metal, single or combined, which plates and bars shall exhibit "angular projections called 'cutters,' formed either upon or

" attached to the said plates and bars in a vertical, horizontal, or
" diagonal direction or otherwise, and so tempered or hardened
" as to resist and destroy any projectile that may come in contact
" with the same, acting inversely upon the well-known mechanical
" principle of the 'cold hard chisel and hammer,' the said pro-
" jection or 'cutter' representing the cold hard chisel, the pro-
" jectile itself representing the metal acted upon, and finally the
" momentum or sum of that projectile's weight and velocity
" representing the 'hammering force.' "

[Printed, 4d. No Drawings.]

A.D. 1862, May 8.—N° 1374.

HAY, JOHN.—(*Provisional protection only.*)—"Improved ar-
" rangements to facilitate the cleaning and repairing of ships'
" bottoms." This invention consists in "applying weight above
" the centre of gravity to one side of the ship, until that side is
" brought sufficiently down in the water to cause the opposite
" side of the bottom to be exposed as far as is necessary. The
" arrangements for effecting this, according to one modification,"
consist "in forming water-tight compartments or casings along
" the inside of the ship's bulwarks, or at as high a part of the
" ship's side as possible or convenient. Pumps arranged to be
" worked by manual, steam, or other convenient power, are pro-
" vided, along with sets of pipes and valves for filling the com-
" partments or casings with water to depress the side of the ship,
" and discharge valves are also provided for emptying the com-
" partments when the ship is to be righted again. In the case of
" vessels which are sufficiently stable when empty no further pro-
" visions may be necessary, but in the case of vessels which are
" at all tender or crank, a water-tight box kelson should be
" adopted to be filled with water to give sufficient stability. Or
" other water-tight compartments or casings may be provided
" instead of or in addition to the box kelson, and the narrow
" angular spaces at the bow and stern of the vessel may be
" enclosed by water-tight bulkheads for the purpose of being
" filled with water ballast. Where there is any danger of the
" vessel being unstable in her careened position, so as to be at all
" liable to overturn, buoyant compartments or casings are pro-
" vided to counteract such tendency. Thus an air casing may be
" formed above or within the water casing along the ship's bul-
" warks. *In the case of* a *ship* with a poop or topgallant fore-

"castle or both, these may be fitted so as by water-tight doors to "be made capable of excluding the water, whereby their enclosed "spaces will, by their buoyancy, prevent a greater inclination of "the ship than is desired. The pumps for filling the water "casings may be adapted to serve as the ordinary ships' pumps, "and if steam power is used for working them, a small portable "boiler and engine for the purpose may be mounted upon a "swinging frame, so as to have its level unaffected by the turning "over of the ship."

[Printed, 4*d*. No Drawings.]

A.D. 1862, May 10.—N° 1405.

MOORE, Robert. — "Improvements in the structure and "appliances of ships and other vessels." This invention consists in substituting iron or other metallic substances, corrugated transversely, longitudinally, or diagonally, for the materials now usually employed in constructing or fitting up certain parts of ships or vessels, as follows; that is to say, "to replace or to "strengthen the present system of framing," "for midship line "strengthening in the nature of girders, for keels or keelsons, "for ties or stringers, in strengthening or in rendering more "buoyant the bottoms, and for decks, ceilings, and other cover-"ings, linings, or strengthenings." The corrugated iron is employed alone or with any other substance according to the nature of the work, and the objects for which the ship or vessel is intended. By this system floors, the great obstacle to efficacious diagonal work, may be dispensed with, and hulls may thus be constructed without floors, either with or without fore and aft strengthenings.

"I employ apparatus for steering from below the water-line, "without prejudice to arrangements for transmitting power from "the deck, whether by the ordinary rudder or transverse screws; "this I effect by rods, bars, or equivalent contrivances, passed "through stuffing boxes, or by wheels or chains working in "water-tight cases or boxes, the said wheels, chains, rods, bars, "or contrivances, receiving their motion from the interior of the "ship below the line of flotation. As an auxiliary in steering, "under certain circumstances, I employ centre boards or plates, "one at" or "near the bow, and another at or near the stern, so "connected in their action that the lifting of the forward one and

"the lowering of the after one, and reversing, will make the "vessel turn by her stern, and vice versâ."

"I employ magnetic indicators for steering or laying the vessel's "course or correcting the magnetic variations of such indicators, "or of the radiated card or table commonly called the mariner's "compass."

"For cranes of ships or other floating bodies loading and dis- "charging, instead of the usual jib or derrick hoist, I construct "moveable travelling cranes with rolling carriages and other "necessary adjustments characterized by a system of levers, tilts, "or lifts, by which the load is shifted in the desired direction for "loading or discharging."

"I use double or shifting shafts for driving propellers," "and "I connect the propeller to such shafts, so as to be applicable for "working partially below the line of keel or bottom of the "vessel."

"I remove accumulations of water and dangerous gases and "foul air from the holds or other parts of vessels by apparatus "having projecting tubular or hollow arms or branches, the sec- "tion of whose orifices is at right or oblique angles or nearly so "to the axis of the column or conduit, by which the gas, air, or "water is raised or expelled, which arms or branches work in the "fluid, gas, or air, to be carried off."

"I employ for ventilating ships or vessels tubes varying in their "application according to the direction to be given to the current "of ventilation, but having for each circuit an induction and educ- "tion port. The peculiarity of this arrangement is, that at or "below the eduction port is a rotating jacket or chamber with an "orifice for the admission into the chamber of atmospheric air, "which in certain cases may require to be artificially excited for "the purpose. This again communicates with an internal tube "or passage by means of apertures in the ventilator, and this "passage leads to or nearly to the top or opening of the eduction "port with reduced space, so as to contract the exit of air, of "which it is the intended channel. The orifice above mentioned "is retained in the direction opposed to the wind by any self- "acting or adjusting contrivance, and thereby a quantity of air is "admitted to the revolving jacket, which passes by apertures into "the interior channel, and is forced through its contracted space, "so as to act *somewhat in the* nature of a blow-pipe, expelling

"continuously the terminal volume of ventilation from the educ-
"tion port."

"I use gutta-percha, caoutchouc, or other elastic or tenacious "material, alone or in combination with other materials, as well as "solid, metallic, or other substances, for filling, facing, coating, "or lining," the "corrugated metals used."

[Printed, 8*d*. Drawing.]

A.D. 1862, May 12.—N° 1425.

HUTCHINSON, WILLIAM NELSON.—"An improvement in "screw propelled ships," for the purpose of increasing their efficiency when under sail. The invention consists "in filling up "the well or space left between the frame or body post and stern-"post in ships propelled by a screw, when the screw is raised, by "causing beams of wood, plates of metal, or other suitable "material to slide down horizontally in succession from the deck "until the aperture is filled.

"The beams or plates are guided in their descent, and are "formed to join or fit on or into each other, and are retained in "their position by the guide bars and tongue and groove, or "other suitable joints."

In large ships "the weight of the plates acts in part as a coun-"terpoise to that of the screw, as both are never out of the water "at the same time.

"Sometimes, in small vessels, I connect the plates together "from top to bottom, and fix the screen so formed to a roller on "each side of the well; I raise and lower the screens by winding "them off and on the rollers, much after the manner of iron "shutters. If required, the plates may be strengthened by metal "cross bars placed edgewise. In some cases I employ flattened "hollow non-water-tight tubes instead of plates; the tubes pre-"sent some advantages when the additional thickness is of no "consequence. They are hung together by rings, and are raised "or lowered by a flexible wire or other rope threaded through "them at both extremities."

[Printed, 10*d*. Drawing.]

A.D. 1862, May 13.—N° 1436.

SARDY, JOHN BEAUJOUR.—(*Provisional protection only.*)—"*Improvements in* the construction of ships of war and other

" vessels." "In order to obviate the difficulties heretofore " experienced in the attempts to construct iron-clad steam ships " carrying powerful machinery and formidable armament, which " greatly increases their draught of water, three or more keels " may be used according to the size of the vessel, and two or " more stern posts having between each a central keel and 'run,' " inclining from the after body of the ship and terminating at the " main transom. By this arrangement a very flat bottom with " easy bilges to the hull and good sailing lines can be obtained " with a greater width of beam than usual, extending very far " aft, and the stern extending in one body above and abaft the " rudders and screws to protect them, and to be constructed for " the purpose of a 'battering ram' if required. While this form of " construction greatly decreases the draft of vessels as compared " with those now in use, it affords facilities for applying additional " propelling and steering apparatus."

The second part of the invention relates to "the use of a " 'battering ram' built on one or both ends of the said vessel for " the purpose of acting against other vessels or structures."

" These battering rams are constructed with and form a part of " said vessels, thereby making them of great strength and firm- " ness, tapering to a point, and terminating either above, at, or " below the water line, as may be desirable. If constructed of " wood, they should be heavily clad with iron or steel.

" I propose in building vessels of war to have their sides and " ends inclined towards the centre from their water line upwards " at a proper angle to glance shot, and also to throw the weight " over the centre of motion. I also propose to attach extra " timbers fore and aft clad with iron, or to attach extra thick- " nesses of iron plates to the sides of the said vessel, if constructed " of iron, at the water line and proper angles, to prevent other " vessels crushing the same. I further propose to have the sides " and deck as well as the 'battering ram' or 'rams' of the said " vessel, suitably clad with iron or steel armour, in order that the " entire ship shall be invulnerable to shot and shell."

[Printed, 4*d*. No Drawings.]

A.D. 1862, May 13.—N° 1448.

LATHAM, ROBERT MARSDEN.—(*A communication from David L. Allen.*)—" Improvements in steering apparatus." The *invention consists in the following* improvements in steering apparatus,

viz. :—"To the steering wheel is adjusted a spindle supported "upon proper bearings, upon which spindle is a vertical pinion "gearing into a horizontal wheel attached to an upright shaft to "be secured to the deck, and to this shaft I attach a wheel which "gears into a quadrant, this quadrant being secured to a proper "attachment, the latter embracing the rudder head, which attach-"ment and quadrant I prefer should be in one casting. The "lower part of the attachment which encircles the rudder head "fits into a ring or socket, which has a flange intended to be "secured to the deck. The ring and attachment, where they "come into contact, should be planed to prevent friction. The "wheel which gears with the quadrant should be of such depth "that it will allow the rudder to rise moderately, without any "danger of throwing the apparatus out of gear."

[Printed, 10*d*. Drawing.]

A.D. 1862, May 14.—N° 1460.

BRANT, JOHN CHARLES.—(*Provisional protection only.*)—"Improvements in the construction of armour-plated ships, and "in cements or compositions for uniting iron to iron and for "uniting other substances, which compositions may also be used "for caulking and for coating" ships' bottoms. In manufacturing cements, according to this invention, "I combine man-"ganese or magnetic oxide of iron with oil of turpentine or any "other essential oil, and add to it Swedish or other pitch and "gutta percha; resins and resinous gums may also be added. "I prefer to take one part of magnetic oxide of iron or manganese, "and make it into a stiff paste with oil of turpentine or any other "essential oil; I then put into an iron pot 2 quarts of Swedish "pitch, and heat it over a fire, and mix in the oxide with it; I "then gradually add to it one part or more, if desired, of pure "gutta percha cut into small pieces; the whole is then brought "to a boil and is kept constantly stirred till it is well mixed "together. The mixture is then removed from the fire and is "kept stirred until nearly cold; it is then poured on to plates "previously covered with water, and when set it is fit for use." "When using the compound for covering ships' bottoms, I heat "the hull of the vessel and rub over it a good coat of the cement, "and when nearly hard, I, by preference, rub in equal parts of the "red magnetic oxide of iron and orpiment or red arsenic with "*drying oil.*"

"The improvements in armour-coated ships consist in pre-
"venting water from getting between the armour plates and the
"outer skin of the vessel, by uniting the back of the armour
"plates to the skin by the cement above described.

"The invention also consists in placing a layer of cork, or a
"layer of lead, or a layer of cork together with a layer of lead
"between the skin of the vessel and the back of the armour
"plates, and when I employ a layer of lead, I prefer to form ribs
"or channels on the surface of the lead, and also when applying
"such layers at the back of the armour plates, I, by preference,
"prevent any water getting between the armour plates and the
"vessel by means of the cement above described."

[Printed, 4d. No Drawings.]

A.D. 1862, May 15.—N° 1466.

JOUVIN, Jean Pierre.—"An improved process for preserving
"iron plated and other vessels and metallic articles from oxida-
"tion and preventing ships' bottoms from fouling." "For pre-
"serving iron ships from oxydation by the action of sea water,
"my process consists in lining the inner surface of ships' sides
"and bottoms," "with sheets or lamina of zinc applied directly
"against the sheet iron, and there held fast between the latter and
"the frames. But as iron ships now afloat present some diffi-
"culty to the application of such zinc sheathing in the interior of
"their holds, I first scour with care the internal sides of the hold,
"and afterwards I apply thereon a double coat of a paint made
"of powdered metallic zinc, which I spread all over from the
"keel up to a little above the water line."

2. To protect the exterior part of the hull immersed, from the deposit of marine shells and plants, mix fifty-five parts of turbith mineral, with forty-five parts of Prussian blue; then take of boiled linseed oil two hundred and fifty parts, of red lead or any other vehicle for the poisonous compound, six hundred and fifty to six hundred and sixty parts, and of the above-named compound, ninety to one hundred parts. Before this poisonous compound is applied, every part of the iron to be immersed or wetted must be previously coated with two layers of the metallic zinc paint, after being scoured as completely as possible.

"This poisonous compound may prove also very advantageous
"if applied to wood employed to secure dikes, embankments, and

"for marine constructions to protect them from injury by teredos. "The smallest particle of the chlorocyanide of mercury and "sodium produced by its contact with sea salt suffices to kill "instantaneously animalculae, plants, and even their germs when "brought within its influence."

3. To apply the invention to iron-plated vessels, "I place either "between the woodwork of the hull and each iron plate a sheet "of zinc, the surface of which is rather smaller than that of the "iron plate; or I first coat this woodwork with a thick layer of "metallic zinc paint, then each iron plate previously well scoured "is similarly painted on its inner face, and adapted to the sides of "the ship."

4. "To preserve sheet iron tanks, marine boilers, steam engines, "and other similar articles from oxydation, I either apply on them, "that is to say, externally, zinc sheets, or I coat them with a "double layer of the afore-mentioned metallic zinc paint." "To preserve the parts of cables and chains stored in wells, "where they are oxydized very rapidly, I apply on each of the "rings or links a band of zinc fastened by screws. I apply the "metallic zinc paint to iron articles in general, wherever red lead "paint is now made use of and as a substitute therefor."

5. "For ships' bottoms with a copper sheathing, before the "sheathing is applied, I coat the woodwork over with a thick "layer of metallic zinc paint. But in the present case it is more "economical to employ powdered cast iron, or, in preference, iron "powder, instead of zinc powder, to prepare the metallic protect-"ing paint, as it will protect copper as effectually. Should it be "found, however, that copper sheathing gets foul with barnacles "and sea weeds it must be coated with the poisonous compound "before mentioned."

[Printed, 4*d*. No Drawings.]

A.D. 1862, May 15.—N° 1477.

WATNEY, ALFRED.—"Improvements in constructing ships, "vessels, and other structures intended to resist shot.' "I "build up the structure of a series of iron (or it may be steel) "plates, which may be of any convenient length and thickness. "It is preferred, however, that the latter should not be great. "These plates I lay one on the other, so that their edges only "are exposed, and I connect each plate by means of rivets to

" the plates in contact with it on either side; one half of the " rivets which pass through each plate being for the purpose of " connecting it to the plates on one side, and the remainder to " those on the other side of it." " Each plate before it is " attached to the portion of the work already completed, has one " half of the holes in it filled by rivets placed through them. " The heads of these rivets all " lie " in the countersunk holes on " one side of the plate, and the ends of the rivets project out " from the plate on the other side." When an additional plate is applied, the ends of the projecting rivets pass through the previously unoccupied holes in the plate, and the plate is then secured by clenching these ends over it.

[Printed, 8*d*. Drawing.]

A.D. 1862, May 16.—N° 1493.

SHARPE, Benjamin.—" Improvements in the construction of " ships and vessels, and in masts and spars for the same." " In " constructing ships and vessels of which the framework is prin- " cipally of wood, in order to give greater strength and security " to the secured pieces of timber, which form the frame and other " parts of the ship, I place on one or on each side of each frame " or piece of timber a plate of metal of corresponding form, and " passing from one end to the other" of it, " so as to cover all the " joints, and I secure the plates of metal to the timber by bolts; " these metal plates hold the pieces of timber securely in their " places, whilst the timber serves to keep the metal plates from " buckling." " I prefer to keep the metal plates out of imme- " diate contact with the wood by interposing tarred felt, paper, or " other suitable substance, and also the coating the iron with " another metal by the process termed galvanizing."

" In order to give additional strength to ships I arrange the " deck beams so as to form a series of hexagons and equilateral " triangles, or nearly so." " When greater powers of resistance " are required, as in steam rams, I add second and third sectional " beams, so that any amount of strength up to a solid mass can " be given," " the whole being worked level both on the upper " and under sides." The different beams are connected by dowells at the junction, and secured with a plate of metal above and below.

For connecting the deck beams with the ship's side, the beams

are cut so as to form a dovetail, which is inserted between the starboard or port longitudinal beams or shelf, and a water-way piece; the beams are again further secured by a straight metal knee, extending diagonally from the sides of the ship to the upper side of the beams. "I construct ships' beams and other pieces of "timber (where great length and strength are required) by "inserting thin plates of metal" "between the wood of which "the beams are formed."

"In order to give the ship strength in a vertical direction I "connect the keel and different decks together in a manner simi- "lar to that already described for the deck beams, and so in like "manner for transverse bulkheads."

"In constructing iron ships I make them as has in some cases "been heretofore practised, with a double skin, the space between "the two skins being divided up by partitions into cells. These "cells have, however, heretofore been made rectangular, or as "nearly so as possible, the partitions being fixed vertically to the "skins. Now, according to my invention, I arrange the parti- "tions so as to incline to the skins, and enclose cells of a trian- "gular section, the partitions inclining alternately in either "direction."

"In constructing the masts and heavy spars of ships, I make "them tubular, and of alternate plates of wood and metal, sepa- "rated by tarred felt or other suitable material; the plates are "arranged to radiate from the centre, so that their width forms "the thickness of the side of the mast or spar. They are secured "together by metal hoops. In war vessels I render the masts, "and it may be other spars, shot proof, by dropping over them "iron rings having a surface of shear steel."

"I also in some cases arrange a lighter spar so as to be ca- "pable of descending into the hollow tubular spar; the lighter "spar will then be protected from shot, besides which it is a "convenient way of working it."

"In forming bowsprits I occasionally make them in two pieces "like the legs of shears, having the lower parts to slip into move- "able sockets or into a piece of wood placed across the deck, so "that the whole may be brought into a vertical position, and "guns fired ahead between the two parts of the bowsprit.

"In armour plating ships I employ plates or bars of iron, each "having an outer surface of shear steel welded or otherwise "*attached to it*," and for the purpose of lightening these plates

or bars, without reducing their strength, deep longitudinal or transverse grooves are made across their inner surfaces; "these "grooves I prefer to be hyperbolic in section, and I employ them "also to receive and hold the heads of the bolts used for securing "the armour plates or bars to the other parts of the ship."

In arranging ships of war "I employ slides to support the gun "carriages." These slides are fixed on pivots immediately behind the ports, so that the slide may incline or train with the gun, and the gun in running in and out traverses on the slide. "I "mount on the slide," or attach to it, a strong shot-proof shield, capable of stopping any shots which may enter by the port. The shield has a narrow slit in it through which the gun is discharged, and this slit is closed, when required, by an iron port attached by hinges to one of the sides. The inventor also describes a compressor for the gun, and a pendulum and sight.

Lastly, he describes a frame or template for ascertaining the curves of a ship's side for armour plates or other purposes. This consists of a moveable frame, with notches for inserting a measure, by which every portion of the curve can be measured and registered. There is a moveable leg which is extended or shortened until all the four legs of the frame press equally against the ship's side. The frame is kept upright by a plummet.

[Printed, 1s. 4d. Drawings.]

A.D. 1862, May 17.—N° 1497.

SIEVIER, Robert William.—(*Provisional protection only.*)— "An improvement in rams for naval warfare." The invention consists in "the application of an independent battering ram or "rams to vessels of war of any class, whereas the battering ram "at present in use consists of a strong prow, which is only "rendered effective by the momentum of the vessel. I construct "and arrange the ram as follows:—On a strong foundation plate "fixed in the vessel I bolt a cylinder in a horizontal position; "this cylinder contains a piston, the rod of which forms the "ram and extends considerably beyond each end of the cylinder. "The front of the rod I prefer to be of steel, so as to act as a "punch. By means of steam or other motive agent and suitable "valves a reciprocating motion is given to the piston and rod, "the velocity thus imparted to the rod or ram, coupled with its "*great weight*, causes it to act as a destructive engine when

" projected against the side of a vessel or battery. The ram may " be placed at the bow or stern of the vessel, or across, if desired. " I prefer to arrange it below the water line, and there may be " several rams in the same battery or vessel. The ram or rod " may, if desired, terminate with the piston, only passing through " the front of the cylinder. The aperture in the side of the " vessel or battery through which the ram is projected, is provided " with a water-tight stuffing box (or other equivalent) which " surrounds and encloses the ram, thereby preventing the ingress " of water. Vessels or batteries of war acting as rams by their " own momentum may be furnished with this supplementary or " independent ram."

[Printed, 4*d*. No Drawings.]

A.D. 1862, May 17.—N° 1503.

NEEDHAM, Joseph. — (*Provisional protection only.*)—" Im- " provements in sheathing or coating iron ships." According to this invention " I sheath iron ships with copper, Muntz's metal, or " other suitable metallic sheathing, and cause it to adhere thereto " by soldering it over its entire surface." It is preferred to compose solder, of tin, lead, and bismuth, which solder melts at a heat of about 212 or 220 degrees Fahrenheit; it is therefore only necessary to heat the iron in a very slight degree, which may be readily done by holding a fire against the sides or bottom of the ship, and so heating a part at a time, and to apply the sheathing thereto; or the plates may be sheathed previously to building the vessel, and the rivet heads and junctions of the plates coated subsequently when the ship is built.

" A further improvement consists in uniting the metal sheathing " to the iron by means of material a non-conductor of electricity. " For this purpose I employ gutta percha, or it may be an analo- " gous material, as a cement, which I interpose in sufficient thick- " ness for the purpose. To ensure a good hold between the iron " and the sheathing, I roughen the surface by jagging or otherwise, " or the plates may be rolled with small indented grooves, the " tops of the ribs between which may be burred over to cause the " gutta percha to adhere mechanically, adding to the natural " adhesive properties thereof."

[*Printed, 4d. No Drawings.*]

A.D. 1862, May 17.—N° 1506.

SICKELS, Frederick Elsworth.—" An improved apparatus " for steering vessels." This invention relates to an improvement upon the invention for steering ships by means of steam or other fluid, for which Letters Patent were obtained " on my " behalf in the name of George Tomlinson Bousfield, bearing " date twenty-first October, one thousand eight hundred and " fifty-nine (N° 2410), the object being to adapt my said inven- " tion the more completely to ships of war. In the specification " of the above-mentioned patent, the barrel which operates the " steering chains receives axial motion directly from a pair of " small engines, the valves of which are governed by the steers- " man, the steering wheel being connected with the excentric " which works the valves. By this arrangement all the force " required to be exerted by the steersman is just sufficient to " work the engine valves, which by merely letting steam into one " or more of the steam cylinders will cause an axial motion to be " imparted through a crank shaft to the chain or rope barrel, " and through the chains or ropes wound thereon to the rudder, " which may thus be retained at any required position."

" In applying this invention to ships of war it is desirable to " place the machinery low in the vessel, out of the range of shot, " while at the same time the steersman must occupy a good look " out position. To provide for this latter necessity while the " machinery is kept low down is the object of the present inven- " tion. I now propose to operate upon the excentric, which " governs the inlet and discharge of the steam or other motor to " and from the cylinders by means of a tension cord or its " equivalent, which may be led upwards and conducted to any " part of the ship where it may be found desirable to post the " steersman. The manner in which I prefer to apply this " improvement is to connect the excentric of the engine valves " with a hollow barrel or drum, carried by the crank shaft, and " intended to receive on its periphery a portion of the cord, the " free end of which is led upwards to the deck or other part of " the vessel where the steersman is stationed. Within this drum " I fit a coiled spring the tendency of which is to keep the cord " wound upon the drum. The steersman holding the free end of the " cord will, by " drawing it " towards him give an axial motion to " *the drum, which, by its* connection with the excentric, will shift

" the valves of the engines, and thereby cause the engines to operate " the steering chains leading to the rudder. When the rudder is " required to be operated in a reverse direction the steersman has " merely to slacken the cord and allow the coiled spring within " the drum to act, which spring by driving round the barrel in " the opposite direction, will reverse the action of the valves." " This arrangement enables me to use indifferently, either steam " or water for actuating the engines, a free exhaust being ensured " for any fluid that may be in the cylinder with ample lap on " the admission side of the valve to prevent blowing through " while in operation."

Any ordinary steering gear may at the same time be attached to the rudder head, so as to work the rudder by hand, the steering chain being detached from the arc on the rudder head, or by simply slipping back a clutch, the engine may be detached from the barrel, and the vessel can then be steered by the hand wheels.

[Printed, 2*s*. 4*d*. Drawings.]

A.D. 1862, May 19.—Nº 1508.

WRIGHT, JAMES.—" An improved method of sheathing iron or " metal ships in order to protect them from the action of salt " water, fouling, and other such like influences." " I propose to " isolate the metal skin of the ship from the copper or other " sheathing by means of a layer of planks, or a layer of planks " supplemented by a layer of india-rubber or felt or other such " gummy water-tight substance; and the gist of " the " invention " consists in the particular mode by which I attach and bind the " said " substances together. " This I effect by passing screw " bolts through the wood and water-tight sheathing into the " similarly tapped bolt hole in the iron skin, and after screwing " it home holding it tight up by means of a nut " " on its inner " end in the inside of the ship, placing an india-rubber and an " iron washer between the skin and the nut, so as to form a per- " fectly water-tight joint; also, to prevent any chance of the " water entering, I place another india-rubber washer under the " head of the bolt in the plank and one over the head of the bolt " so as to " completely " isolate the latter from the sheathing " metal. This being done, I then nail on the copper or other " sheathing in the usual manner."

[Printed, 4d. No Drawings.]

A.D. 1862, May 21.—N° 1531.

KENNEDY, John.—(*Provisional protection only*).—" Improve-
" ments in plates for plating and for forming the outside skin of
" ships and vessels, and in protecting the same from fouling and
" oxidation." The invention consists " in forming iron or steel
" plates to be employed for the outside skin or surface of ships
" and vessels, with a rib or ribs rising from that which is to con-
" stitute the outside surface of the plate, in forming a rabbet or
" V-groove in the sides of the ribs, in inserting strips of iron or
" steel into the grooves between every two ribs, space being left
" between the surface of the plates and the said strips, and in
" filling up the spaces between the ribs and above the level
" thereof with white lead. I finish off the white lead face smooth,
" allow it to set and harden, and then paint it or not, or apply
" an oily or greasy material or composition thereon or not, as
" desired." " The object of the metal strips is to assist in holding
" on the white lead; care must be taken to ensure the metal
" being clean and free from oxidation before applying the white
" lead."

[Printed, 4d. No Drawings.]

A.D. 1862, May 21.—N° 1534.

BUSH, William.—" Improvements in the construction of ships, " and in shields or armour for ships and batteries." The invention consists in constructing ships intended chiefly as ships of war and floating batteries. The ribs and girders are formed of angle or bar iron bolted together, and with timber between every two irons. The outside of the ship may be of timber or of iron, or partly of each, rivetted or otherwise secured to the ribs. Between the outside or hull, and the skin or inner lining of the ship, which it is preferred to make of iron, there is a space into which, and between the ribs, are inserted moveable iron or steel blocks or plates of armour, which may be made to slide up and down in this space, so that they may be inserted and removed as required. Under the port-holes on each side of the ship, the blocks are connected to an oscillating platform which carries the gun and carriage, by which means one half of the usual complement of guns and men may be dispensed with. The gun, after discharge, recoils, causes *the platform to tilt,* and thus brings up the block *to close and shield the port* hole.

"I fit a turntable for the gun carriage to run on, so that if
" required the gun may be turned, and run out to be fired on the
" opposite side of the ship; or it may be again run out on the
" same side, its forward motion causing the shield to lower and
" open the port hole. A space between the armour block and the
" outside of the ship may be filled with felt, kamptulicon, or other
" suitable material."

"To facilitate the moving of the fort from place to place, I fit
" at the lower part thereof, and extending through it, two or more
" cylinders," " in which valves or screws may be fitted and made
" to work, and the fort thus propelled and guided at one and the
" same time. If required, a rudder may also be employed. In
" addition to the cylinders being employed as a medium for pro-
" pelling the fort, the water contained in them materially tends
" to steady the fort in a big sea."

The inventor also describes a gun and rocket boat, fitted with oscillating platforms and shields, according to the invention. This vessel has a water channel or water way extending the whole length of the bottom of the ship, the bow and stern of which are alike. There is a propeller at each end driven by separate engines. There are three cupolas, one at the bow, another midships, and a third at the stern, each being fitted with oscillating platforms for working the guns, and there is a rudder and steering apparatus at each end of the ship, so that she need not be turned when required to be moved in a contrary direction. By dispensing with the oscillating platforms, cupolas, and other appliances necessary for naval warfare, ships of this description are "particularly
" suitable for mercantile purposes, for conveying goods in shallow
" waters and against swift currents, the propelling power at each
" end enabling me to obtain much greater speed than has hitherto
" been accomplished in steamers of the ordinary construction."

In constructing armour or shields for ships and batteries, armour plates or blocks are connected to an oscillating platform, which may be made to work armour or shields at both ends, so that while the port holes on one side are shielded, the shields are removed from the portholes on the opposite side.

The invention further consists "in constructing ships with
" hollow metal keels in keelsons, and with water-tight compart-
" ments for the purpose of containing fresh water and other
" provisions, as well as for affording stability to the ship, and for
" '*heeling*' *her over*."

[Printed, 1s. 10d. Drawings.]

A.D. 1862, May 22.—N° 1546.

KENNEDY, JOHN.—(*Provisional protection only.*)—" Improve-
" ments in protecting the sides and decks of ships from the
" effects of projectiles." The invention consists " in protecting
" the sides of ships by means of wire ropes, in coils or otherwise,
" supported by metal springs. Instead of or in addition to the
" wire ropes, plates may be used. For the decks I use metal
" plates backed or supported upon metal springs. The object of
" my invention is to afford at the same time a resisting and
" yielding armour."

[Printed, 4*d*. No Drawings.]

A.D. 1862, May 22.—N° 1553.

GÕRANSSON, GÕRAN FREDRIK.—(*Provisional protection only.*)
—" Improvements in the construction and arrangement of armour
" plates, applicable to ships, forts, batteries, and other structures,
" and to a mode of securing the same." " It is proposed to
" employ a number of ribs or rails, having enlarged or expanded
" heads of a round or other transverse section, which are secured
" by bolts to the surface to be protected. Over these ribs are
" laid transversely one or a series of plates, bent so as to
" conform exactly with and fit accurately the corrugated surface
" produced by the ribs; by this system the head of each rib or
" rail serves to hold the plates firmly in their places, and when a
" series of plates are thus bent and laid one over the other, the
" inner plate or plates will always hold the outer one securely.
" The surface of the plates so disposed presents a series of corru-
" gations or ribs, and in the hollows between these corrugations
" may be driven round or other shaped bars, so as to fill or par-
" tially fill the intervening channels or grooves."

[Printed, 4*d*. No Drawings.]

A.D. 1862, May 23.—N° 1561.

MAW, EDWIN.—(*Provisional protection only.*)—" Improvements
" in constructing ships, vessels, forts, and batteries." The
invention consists in constructing " hollow armour plates and
" backing by combining corrugated sheet metal with other forms
" or descriptions of iron, steel, or homogeneous metal; the corru-
" gations of one or more of these corrugated plates abutting
" against *each other, or* against a middle uncorrugated plate or

" plates. By these means with the same weight of metal I pro-
" duce a greater resisting strength, and a strong body capable of
" resisting the shock caused by the concussion of projectiles with
" the outer plated surfaces. By means of a middle plate I facili-
" tate the jointing and overlap of the corrugated plates, and
" reduce the strain upon the fastenings. In order to produce a
" uniform bearing and resistance when using middle plates, I
" form in such plates, at such intervals as may be desired, corru-
" gations corresponding with the corrugations of the other
" plates, the other parts of the middle plates being left plain or
" flat, by which means what may be termed curved tongues are
" produced, which contribute with the other parts of these plates
" materially to retain all parts in a sound condition."

" In order to prevent the splitting of the solid iron armour plates
" similar to those now in use, ferrules or casings in one or more
" parts are used, shrunk into an inner tube, made in whole or in
" part of iron, steel, or homogeneous metal; and I further cover
" the bolts or rivets to be made either hollow or solid for fasten-
" ing the armour plates or backing together, or to the vessel or
" backing" " with casings of steel, iron, or homogeneous metal
" for the purpose of strengthening them and preventing them
" splitting.

" In order to obtain a flush surface for receiving thick outer
" armour plates or an outer skin, I apply plates or bars, by
" preference with ribs or beads at the backs, in order to cover the
" hollows or valleys of the corrugated plates. The corrugations
" of the plate are so formed and applied, that the corrugations are
" vertical when in the structure.

" In some cases the corrugated plates, whether a middle un-
" corrugated plate be used between them or not, are fixed together
" by hollow rivets, through which long bolts are passed, by which
" the outer and inner plates are fixed to each other and to the
" corrugated plates between them.

" In other cases solid rivets are employed to fasten the corru-
" gated plates where the corrugations butt together and then the
" outer and inner skins, whether of armour plating, or otherwise,
" are fastened to each other and to the corrugated plates by bolts
" passed through other parts thereof.

" In some cases hollow cast plates are employed as armour or
" as backing plates."

[*Printed, 4d.* No Drawings.]

A.D. 1862, May 26.—N° 1567.

DE BERGUE, CHARLES.—(*Provisional protection only.*)—" Im-
" provements in iron framing applicable to supporting coverings
" or surfaces intended to resist blows or pressure." The inven-
tion consists in constructing "iron framework of two series of
" ribs or beams, one series of them shaped and applied to give the
" desired sections or form in one direction, and others shaped
" and applied crossways to the first series to give the desired
" sections or form in a cross direction, and the two series
" being rivetted or connected together, and further strengthened
" by struts or ties, or bars applied in a direction at right angles
" or nearly so to both sides of beams, and rivetted or connected
" to both, and fitted, where necessary, with filling up or bedding
" pieces for affording additional support to the intended coverings
" or surfaces."

" I purpose constructing armour-plated vessels with a triple or
" compound skin applied externally" upon such framing; "the
" said skin consisting of two thicknesses of armour plates, with
" solid timber filling applied between the two. The inner metal
" portion of the skin may be rivetted to the framing, and the
" outer metal portion may be bolted to the framing through the
" wood and the inner metal portion."

[Printed, 4d. No Drawings.]

A.D. 1862, May 27.—N° 1590.

HAY, JOHN.—(*Provisional protection only.*)—" Improvements in
" war ships, also applicable in part to floating and land batteries
" or forts, and in part to mercantile and other vessels." "This
" invention comprises improvements in the various details of war
" ships, and has generally for object the combining together of
" the various parts and functions in such a way as to produce a
" war ship superior in every respect to any hitherto existing, as
" well for aggressive as for defensive operations. Some of the
" improvements are also applicable to floating and land batteries
" or forts, and some to mercantile and other vessels."

1. As regards the external form of the improved war ship. The
horizontal outline consist of two circular arcs or similar curves
both ends being pointed and alike. "The mid-ship section
" presents a projecting angle at the line of flotation, this angle
" being continued from end to end of the vessel on each side.

" Springing from the upper face of the angle an arched roof or
" covering extends completely across from side to side, whilst
" from the angle, in a downward direction, the outline is gra-
" dually curved into the broad flat bottom. The outline of the
" arched roof is at each end curved down to meet a raking stem
" at a point a little below the line of flotation. These pointed
" ends qualify the ship to act as a powerful ram, and the angle
" along the sides permits of its also being used as a ram sideways
" with impunity and advantage. To prevent the vessel, when
" acting as a ram, from entering too far, strong projecting wings
" are provided at the sides at points twenty or twenty-five feet
" from either stem, such projections also carrying the catheads,
" and being formed with hawse holes for the anchor cable, whilst
" the anchors may be stowed behind the projections so as to be
" protected by them."

2. As regards " the construction, strengthening, and defensive
" plating. The hull is constructed throughout on the cellular
" system, as is also the main deck, which, springing from the
" lateral angles, extends across in a slightly arched form beneath
" the roof. The cellular construction comprises rectangular di-
" visions of metal strengthened by diagonal trusses of timber."
At the extreme angle of this side, the metal is fifteen inches in thickness horizontally, and behind it there is a two-inch thickness of vulcanized rubber, backed by one-inch iron plate, this again having within it a seven-feet thickness of cotton waste, or such like material, powerfully compressed, and finally a mass of coals, the bunkers for which are arranged along the sides for this purpose. The curved roof is strengthened internally by a strong arched framework, which may be encased to form compartments for fuel, water, or compressed packing.

3. As regards the propelling, manœuvring, steering, and observing. " Screw propellers, made by preference of malleable
" iron, are provided at each end, and there are also propellers
" amidships, three sets of engines being provided for driving the
" series, and being connected by shafting in such a way that they
" may work in concert or separately. Each screw propeller is in
" a well or opening near the stem, and consists of blades mounted
" so as to balance each other on opposite ends of a short crank
" shaft worked by a connecting rod from above, and mounted in
" a swivelling frame, so that any direction may be given to the
" *propelling action*. Rudders are also provided in spaces beyond

" each propeller, but within, and protected by each stem, there " being also a strong guard which protects both rudders and pro- " pellers from injury. The steering is effected from the centre of " the ship, where a shot-proof round house is provided, whence " observation may be made, and whence the entire movements of " the ship may be controlled and regulated. This round house " is surmounted by a conical shot-proof hood arranged to revolve " freely, so that unless a shot should strike with almost impossible " nicety in a radial direction, its force would mainly spend itself " in giving motion to the hood." "To permit of a clear view " being obtained directly fore and aft," " the boiler funnels are " disposed to the sides of the centre line, and to protect them " from shot they are enclosed with loose shields, which will revolve " on being struck." " Shafting and connecting gearing is fitted " between the engines and the windlass or windlasses for the pur- " pose of applying the engine power or a portion of it to heave " short and raise the anchor or anchors, so that in an emergency " this operation may be effected in the shortest possible time."

4. As regards the armament. Two large moveable pivot guns are arranged upon platforms with projecting covers, "the plat- " forms being made moveable and with gearing, so that they can " be elevated by steam power above the ship's roof to be dis- " charged, and be lowered down again to be loaded inside. " Powerful springs are arranged to take the recoil of the guns, " and have the effect of returning them to position immediately " after the discharge. Two large mortars are likewise provided " with similar arrangements for raising them to be discharged, " and lowering them inside to be loaded."

[Printed, 4*d*. No Drawings.]

A.D. 1862, May 27.—N° 1595.

HUDSON, Charles Hodge.—" Improvements in defensive " armour." The object of this invention consists chiefly "in " the use of certain means, appliances, and arrangements for the " purpose of lessening the percussion of projectiles upon the " backing or supports of metallic armour, by the introduction of " water between the said supports and the protecting armour, and " also around its fastenings. I effect this by covering the sur- " faces exposed to the action of projectiles with a metallic structure " *of a cellular form,* presenting a strong surface to the action of

"the projectile, and, from its construction, capable of holding "and retaining water within its cells or between its inner surface "and that of the supports or backing. This arrangement or "system of defensive armour is applicable to all kinds of objects, "whether moveable or fixed on land or water, although chiefly "applicable to ships."

The first plan for carrying out this principle consists in covering any part of an object which is to be protected from or against the action of projectiles, with a casing of metallic tubes, consisting of one, two, or more rows in thickness, or arranged so as to form an angular surface. These tubes are firmly held to the supports or to the skin of the ship, by means of metallic plates stretching across the surface, and fastened at the bottom to the skin and frame of the ship under or near the water line, while the upper portion of the plate being turned inwards, is fastened to the inner part of the ship's frame, deck, or sheathing.

2. In turning and returning the ends of armour plates, so as to form with the side of the ship or other object a hollow and nearly rectangular compartment. A clip or washer bar is placed along and over the returned part of the plate to which the bolts are fastened.

In order to subdivide the compartments formed by each row of the plates above mentioned, a series of hollow boxes or troughs are placed over the joints of each pair of plates. These troughs or boxes will not only increase at the weakest point the resistance of the plates, and strengthen the frame of the ship, but they also serve to separate the compartments for the water.

Another arrangement is shown by means of which the water can be introduced between the skin of the ship and the armour plates, and also on the deck. This consists in forming a series of supports between the side or deck of the ship and ordinary armour plating, so as to leave an interval between them which may be filled with water.

[Printed, 10*d*. Drawing.]

A.D. 1862, May 28.—N° 1599. (* *)

ROGERSON, John.—(*Provisional protection only.*)—"An iron "floating dock to be used for the purpose of building and "repairing ships, steamers, barges, and floating vessels of all "descriptions."

According to this invention (which is not very clearly described) the dock apparently consists of an outer portion having "sides, "end, and gates" of wrought iron "box shaped, perfectly water-"tight," and having sufficient floating power to carry the weight of certain columns, machinery, an upper platform and a "lifting "platform," which is capable of being raised and lowered within the outer portion, and which is apparently made of iron, furnished with keel blocks, and divided into water-tight compartments, there being in each compartment a sluice fitted with valves and rods, by which the sluices may be opened and closed at pleasure, pumps being also placed in these compartments, which are worked by a steam-engine when necessary. From the description given it appears that when it is requisite to raise a vessel the sluices in this lifting platform are opened, and water being thus admitted into the compartments causes it to sink. The vessel is then floated over the platform, and the sluices closed, the pumps being then put into operation to draw the water from the compartments of the platform, and so causing it to rise, carrying the vessel with it. The lifting platform is connected with the sides of the dock by guide rods working inside the columns mentioned above, which are arranged along such sides. The lower ends of these columns are securely attached to the sides of the dock, and the heads of the columns to each other by wrought-iron girders, the guide rods or pistons which work inside them being firmly connected at one end to the lifting platform, and having an eye at the other to which a chain is attached, the latter "working over a sheave, for "the purpose of regulating the depth to which the lifting plat-"form is required to be sunk when docking or undocking a "vessel." As the platform rises these guide rods "guide it "exactly into its position, and as soon as the keel blocks take the "vessel's keel, and she begins to free, then the bilge blocks are "immediately hauled in underneath the bilge, to keep the vessel "upright as she is lifted out of the water. The dock gates are "opened and shut at pleasure by means of two powerful winches, "one placed on each side of the dock to work each gate. The "engine for working the pumps is placed at the end of the dock, "and the shafting is brought along each side of the dock, working "in carriages underneath the upper platform, and immediately "above the column heads. On the shaft, in way of the pumps, "are excentric sheaves for pumping."

[Printed, 4d. No Drawings.]

A.D. 1862, May 28.—N° 1601.

HARRISON, James Fortescue.—" Improvements in preserv-" ing the bottoms of ships from the attacks of barnacles and " other incrustations." " I apply to the bottoms of ships or " vessels plates or sheets of wrought or cast iron, or other metals, " or admixtures of metals, or slates covered with vitreous glaze " or enamel, fused at a high temperature, or with waterglass, or " silicate of soda or potash, which latter may be applied either " direct to the bottoms of ships, or on plates or slates to be affixed " thereto. These covered sheets or slates are to be affixed to " the bottoms of vessels or ships by aid of marine glue or other " suitable glue or adhesive mixture, or by the aid of Portland " cement or other cement, or by screws, rivets, or other fasten-" ings."

" As since the filing of my Provisional Specification I find that " iron plates covered with enamel are claimed by another party, " I do not lay claim to the use of enamelled iron plates as de-" scribed, but with this exception I claim my invention sub-" stantially as herein specified."

[Printed, 4d. No Drawings.]

A.D. 1862, May 29.—N° 1618.

GRIFFITHS, Robert.—" Improvements in marine propellers " for ships and boats, and for the sheathing of iron ships with " metal sheathing to keep them from fouling." The third part of this invention "relates to the sheathing of iron ships with " copper or other suitable sheets of metal (such sheets being per-" forated with holes stamped therein) to keep them from fouling, " and this I propose to do in the following manner:—The " bottom of the ship should be first well cleaned and painted " over with one or more coats of red lead, paint, or any other " suitable material to preserve the iron. I then cover the part " required to be sheathed with metal sheathing with some pre-" pared adhesive material, such as a mixture of tar, pitch, or " other suitable substance, and upon that I lay a coating of felt, " gutta percha, or other suitable materials, and on that I again " place another coating of adhesive materials, upon which I place " the perforated metal sheathing, which is made warm on being " applied to the ship's bottom, and is pressed on to the adhesive

"material until it comes through the perforated holes made in "the metal sheathing; or the holes can be filled with short metal "nails made rough, so as to set and fix themselves in the adhesive "materials. I then propose to solder, fold, or overlap the edges "of the sheathing sheets together, and to line the sides of the "ship at or above the water line with a cleating of wood well "secured to the vessel, so as to protect the covering and adhesive "materials, and to which I secure the edges of the sheathing "metal with sheathing nails. I also propose, if necessary, to "place narrow pieces of elastic substances (or strips of wood) "well secured to the ship along the ship's side at suitable dis- "tances apart, to which I fix the sheathing with nails, in the "same manner as above proposed, to the cleating."

[Printed, 8*d*. Drawing.]

A.D. 1862, May 29.—N° 1622.

MINTON, SAMUEL.—(*Provisional protection only.*)—"An im- "proved construction of revolving battery." "This invention "relates to certain improvements on the floating rotating battery "for which I obtained, in conjunction with Richard Handley "Thomas, Letters Patent dated 3rd April 1858, N° 715. In the "Specification of that patent, in order to facilitate the turning of "the shot-proof chamber containing the guns, I shewed and "described a deep tank for receiving a water-tight compartment "or caisson forming part of a rotating chamber. The caisson "portion was situated below the gun platform, and was immersed "in water in the tank, thus giving the chamber the requisite "amount of buoyancy. This elongation of the chamber, and "the deep tank for receiving it, was for the sole purpose of giving "buoyancy to the battery, and involved a considerable outlay for "its manufacture. I now propose materially to reduce the depth "of the caisson and tank, and to obtain the requisite buoyancy "by the use of mercury in place of water." "To avoid the "vaporization of the mercury, I propose to run a film of oil or "other suitable fluid over its surface."

Suitable means are provided for making the revolving chamber shot proof, for causing it to revolve, for reducing friction while revolving, and for stopping the overflow of the mercury when the ship is rolling.

[Printed, 4d. No Drawings.]

A.D. 1862, May 31.—N° 1646.

BETTELEY, JOSEPH.—" Improvements in ship building and in " rendering ships shot proof." In constructing the ribs or framing of ships or vessels, when iron is used planked over with wood, in place of using the sections of iron heretofore employed for the ribs or framing, grooved iron is used, that is, iron bars formed flat on the outer side or surface against which the wood is to be fixed, and formed on the inner side or surface with flanges at the edges, or in place of this, bulb iron may be employed.

" The iron ribs are placed transversely across the vessel, so that " they run in a vertical direction from the keel upwards. The " planks at the outside of this framing are fixed in a direction " from stem to stern, or fore and aft; in the space between the " ribs a further planking is used, such second planking being " parallel with the ribs, thus running in a vertical direction from " the keel upwards. This planking is fixed to the previous " planking by bolts, or in any convenient manner, and the seams " of both the plankings may be caulked."

Instead of employing planking between the ribs, two layers of planking may be worked outside of the ribs, the outer layer of planks covering over the joints of the first layer, or one layer only of planks running longitudinally of the vessel may be employed.

" In order to construct a vessel capable of resisting shot, I " employ iron frames or ribs such as are above described, and to " these ribs or frames I bolt iron plates running longitudinally " of the vessel, the edges of the plates which are bolted to the " ribs being provided with flanges." " Between the iron plates I " place wooden planks," " the outer edges of the planks being " flush with the outer edges of the iron plates, so that each iron " plate is separated by a wooden plank from the iron plate above " and below it; the wooden planking should, however, be of " small thickness, so as not to allow a shot to pass between the " plates. A coating of iron plates may be fixed so as to form " an outer skin to the vessel, bolts being passed through the " skin into the wooden planks. Each of the longitudinal iron " plates has holes formed through it, so that as the ship is being " bolted spikes or bolts may be driven through them and into the " wooden plank below, and also after passing through the plank " into holes in the longitudinal iron plate below the plank. In " *place of employing* iron plates" with interior flanges only,

"the outer edges of the iron plates may be formed with flanges "in addition to the inner edges;" "being so formed, the flanges "on the outer edges of the iron plates will thus form an outer "skin to the vessel, or the iron plates may be provided with "flanges on their outer edges only." "In some cases, in build-"ing ships, I also place such iron plates between the longitudinal "planking at the bottom or side of the vessel to give increased "longitudinal strength."

In constructing deck beams and fastenings for wood ships, it is preferred to employ two angle irons kept at a distance apart by hollow distance pieces, fixed by passing bolts or rivets through them at intervals along the beam. At each end of a beam the two angle irons are turned outwards from each other to form horizontal knees, and between the two irons of which a beam is constructed an iron knee is introduced at each end of a beam, and is fixed thereto by rivets or screw bolts.

In place of constructing the middle portion of a deck beam with two plates, kept apart as above explained, the middle portion of a beam may consist of a single piece of bulb or angle iron, the two ends of the beam being composed of two plates or angle irons, suitably kept apart, and bent outwards at their ends one from the other, iron knees being introduced and fastened between the two plates where the beam is fixed to a ship's side.

"Another part of this invention consists in employing iron "bolts coated with lead, or lead combined with other metals, for "connecting together the different parts of ships. For this pur-"pose the iron bolts are first coated with solder or tin, and are "then coated with lead. I also use steel bolts for fastening iron "frames to wood planking."

In some cases, in constructing vessels, I also combine with them longitudinal iron stringer or tie rods, running from end to end of the vessels, and intermediate of the length of the rod I provide means for tightening it, the rod being divided at its centre, and having formed on the adjacent ends right and left handed screws, on to which is screwed a tube, also formed with interior right and left handed screws.

[Printed, 1s. Drawings.]

AD. 1862, May 31.—N° 1653.

NEWTON, William Edward.—(*A communication from James Eads.*)—"*Improvements* in the construction and operation of

" shot-proof gun towers, and the working of the guns therein for sea vessels, floating harbour defences, forts, or land fortifications." The object of this invention is, first, to construct the gun towers and the gun carriages used therein, in such a manner that both may be lowered into the hold or below the gun deck when required, the working parts being so arranged that the guns may be lowered without the tower when in action. To this end the gun carriages or platforms within the tower, and also in some cases the tower, cupola, or shield itself should be mounted on a strong framing, which is capable of being raised by the elastic force of steam acting on a piston working in a vertical cylinder. By thus being enabled to lower the weight of the guns and carriages, and also the tower itself into the hold of the vessel, instead of carrying it upon the deck when sailing or steaming at sea, the vessel will be more steady and not so liable to roll. The guns may also be loaded with safety while in action. The size of the tower may also be kept within very moderate dimensions, the loading being done below decks from the outside of the tower.

2. To raise and lower the guns by steam power, and to cause the tower to rotate, and to run the gun or guns out of the port or back, and also to take up the recoil of the gun or guns by use of steam.

3. To level the gun in the tower in the act of raising it, by means of a projecting stud pin or stop-piece placed near its muzzle, in combination with a fixed guide on the tower, so that as the gun rises, the stop-piece thereon, by coming in contact with the fixed guide, may so point the gun that a very small port only will be required, as the gun must by this arrangement for pointing it, enter the port fairly without striking the sides of the port.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1862, June 9.—N° 1721. (* *)

GIACHOSA, FERNANDO.—" Improvements in ventilating " mines, ships' holds, and other places."

" The object of my improvements is to facilitate the removal " of carbonic and other obnoxious and deleterious gases or " vapours from mines and other places. For this purpose I " employ chambers formed by covers and diaphragms or par- " titions the surfaces of which are combined by cylinders of " leather or other suitable flexible material. The bottom of the

" chamber or the lower of a series when a series is employed is " connected by a cylinder of leather or other suitable flexible " material to a bell-mouthed collector adapted to collect or " admit of the flow of the gases from the lowest surface where " such apparatus is applied. Motion is given by suitable mecha- " nism to the diaphragms or partitions to the chambers or to one " of them to effect the alternate expansion and contraction of " the chamber or chambers for the reception of the gases and " for their being forced upwards by suitable passages in connec- " tion with such chambers or chamber."

[Printed, 10*d*. Drawing.]

A.D. 1862, June 11.—N° 1736.

WAKE, John Davis.—" Improvements in the construction of " ships and vessels." The invention consists, first, " in construct- " ing ships with double or single wooden floors, and with iron ribs " or frames of T iron or double angle iron rivetted back to back to " form T iron, also with reverse angle iron when required for " ceiling."

2. " In uniting the iron ribs to the wooden floors by either " inserting them underneath the bottom of the floor of the double " angle or T-iron rib or by bringing the ribs alongside of the " floor, one side being underneath the floor and acting as a shoe " at floor heads, bolting the rib or frame to the floors either up " and down or sideways as convenient." The ribs or frames extend underneath the floor and meet in the centre line, and the two ribs or frames are joined by a plate rivetted to them.

3. " In the employment of a longitudinal iron plate as a sheer " streak outside the frames from stem to stern, and an iron " plate along the floor heads outside to connect the diagonal " bracing."

By means of this invention all vertical timbers between the skins of the vessel are dispensed with.

[Printed, 10*d*. Drawing.]

A.D. 1862, June 13.—N° 1758.

WILSON, John. — (*Provisional protection only.*) —" Improve- " *ments in the construction* of ships for war purposes, applicable

"direct blow from a hammer, and will hold into the timber "or other substance into which it may be driven with greater "tenacity than the plain circular bolts now in use."

[Printed, 8*d*. Drawing.]

A.D. 1862, June 20.—N° 1820.

ADAMSON, Daniel, and LEIGH, Levi.—"Improvements in "the construction of steam boilers, and in apparatus connected "therewith, part of which is applicable to ship-building." The invention consists, first, in drilling holes in the curved plates forming part of steam boilers, by means of any convenient number of radiating drills acting simultaneously.

Secondly, in certain improved combinations and arrangements of machinery for drilling several holes simultaneously through boiler plates.

"In drilling the circular shells or flues of boilers, we make "use of a centre column and a top and bottom plate, the portion "of flue or case to be drilled is supported on the centre column, "and is raised or lowered by a centre screw and nut or other "suitable apparatus. The driving apparatus is supported in the "top plate, and the drilling headstocks are supported on the "bottom plate, six or other convenient number of drills radiating "from the centre are employed, each drill being furnished with a "following spindle placed on the other side of the plates to be "drilled; when the annular seams are being drilled, the six or "other convenient number of drills act simultaneously, and "when the holes are drilled through both the plates, the portion "of the boiler is turned round to bring a fresh space opposite "the drills, when the longitudinal seams are being drilled, the "portion of the boiler is raised after each hole by the centre screw "or other apparatus."

"By thus drilling both plates simultaneously instead of punch-"ing them separately, as heretofore customary, great accuracy is "insured, and the boiler when completed (by rivetting the plates "together) is stronger and more durable, arising from the "accuracy of the work, and the holes not being made in the "plates until after they are bent to the required form or shape, "and thus securing an equal strain on each rivet when put to "work, and removing the risk of cracking the plates with bending after the holes are punched."

"In some cases it may be desirable to reverse the arrangement "of the driving apparatus and lifting screws by placing the "driving apparatus under the foundation plate, and adapting the "lifting gear to the top plate."

"Thirdly, in rolling flanges on the edge or edges of plates "employed in the construction of steam boilers, and for ship-"building, which flanges are secured together by rivets or "welding," "as described in the Specification of Letters Patent "granted to the within-named Daniel Adamson and Leonard "Cooper, on the Twelfth day of August, One thousand eight "hundred and fifty-two, Number 14,259."

"And, fourthly, in applying a system of perforated pipes to "steam boilers for distributing the feed water, and in connecting "the said pipes to a blow-off cock for removing the sediment."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1862, June 27.—N° 1881.

SMITH, Alexander Anderson Black.—(*Provisional protection only.*)—"Improvements in apparatus for steering ships "or other vessels." "The rudder head is furnished with a "'tiller' or lever arm, to which the ends of ropes or chains are "attached which pass in opposite directions around blocks or "pullies carried by arms or projections fixed to the deck or other "part of the vessel. From the sheaves or blocks the ropes or "chains pass to and around a grooved drum or barrel, to which "the other ends of the ropes or chains are fixed. The grooved "drum or barrel is carried by a vertical (or it may be in any other "position) shaft or axis supported in fixed bearings, and on the "upper end of this axis a toothed bevil wheel is fixed, which "takes into and is driven by a bevil pinion fixed on a horizontal "axis, upon which the hand or steering wheel is fixed, and by "which motion is communicated to the rudder when required. "In place of two ropes or chains, one may be employed, taking a "sufficient number of turns around the drum to prevent slipping, "and, if desired, two tiller arms may be fixed to the rudder head "in place of one, as described."

[Printed, 4*d*. No Drawings.]

A.D. 1862, June 27.—N° 1893.

BANKS, Daniel Lancaster.—(*Provisional protection only.*) —"A method of constructing a portable sectional dry dock and

"apparatus connected therewith." "I construct a caisson of "wood, iron, or other metal, and which I prefer to be of the shape "on two of its opposite sides of that of a right-angled triangle, "with the" hypothenuse "curving inwardly towards the right-"angle." "Upon the curved side of the caisson running with "the curve at any desired distance apart, or with sufficient space "between them, so that a man may conveniently work, I attach "on their edges two plates or ribs of suitable width, leaving a "margin between the outer sides of the plates and the outer "edge of the side of the caisson. I connect the two ends of the "plates at the base end of the caisson by a cross plate, leaving a "similar margin outside of it; thus the plates are continued "round the three sides of the caisson's curved side, leaving a "margin. These plates may be adjustable, and there may be "change plates so as to be adapted to the various shapes of dif-"ferent bodies along the outer edge of the plates. Along their "length I attach by means of bolts or rivets vulcanized sheet "india-rubber, waterproofed leather, or canvas in folds, or other "flexible material." "Upon the outward edge of the india-"rubber may be a pipe or tube of the same material, closed at "the ends, and filled with air, water, cotton waste, or other "yielding substance; or the india-rubber may be edged with "thrumed matting; to the pipe at the back opposite the margin "I attach iron or other metallic pressure plates or wooden battens, "the edges and plates so constructed that they may be adapted to "the different shapes of various bodies. Also on the curved side "of the caisson, on the margin, I form bosses, with bolt holes "through them into the caisson. The holes are fitted with strong "set bolts and nuts. The bolts have stuffing boxes to keep "them water-tight, the bolts are worked from the inside of the "caisson, the points are connected to and act on the pressure "plates attached to the pipes or other edging of the india-rubber. "I fix a pump in the caisson for the purpose of pumping the "water out of the dock or caisson, the partially enclosed space "contained by the curved side of the caisson and the plates "on edge and cross plate with the 'india-rubber' edging. This "space, when dry, I call my portable sectional dry dock."

"I apply the dock with the india-rubber edging towards that "part of the vessel, or other structure in the water, upon which it "is desired to operate, and attach the dock to the vessel or other "*structure by* means of ropes, chains, or other means. I then

"set the pipes or other edging against the vessel by means of "the set bolts acting on the pressure plates, and bring the "pipes or edging to a joint; the water may then be pumped "out of the dock, and thus will be laid dry that part of "the vessel's bottom to which the dock is opposite or attached; "the desired operations may then proceed." "The caisson may "be constructed with cellular compartments in the sides and "bottom, or it may be divided by bulkheads."

The caisson may also be mounted upon wheels, and have a line of rail or roadway underneath it, at the bottom of the water, for wheels to run upon.

In constructing sectional docks according to this invention, one or more caissons may be used, and the sectional dry dock may be any fractional part of a dock.

[Printed, 4*d*. No Drawings.]

A.D. 1862, July 1.—N° 1918.

LUNGLEY, CHARLES.—"Improvements in constructing, build- "ing, and working floating docks and other floating bodies, and "in pumping apparatus to be employed therein."

The invention relates, first, "to a new mode of constructing "and building floating docks and other floating bodies of either "iron or wood, or partly of iron and partly of wood, in such "manner that great advantages may be obtained in building and "repairing the same, while a great advantage may also be ob- "tained in using such docks as regards economy both of expense "and time."

And, secondly, "to a method of fitting the pumps or pumping "apparatus in floating bodies in such manner that economy in the "power required to work them, and facilities for repairing them, "may be obtained."

"The first part of my invention consists in constructing and "in building the docks and other floating bodies in several distinct "parts or sections, which may be connected afloat, whereby only "room enough on shore, or in another floating dock, is required "for building one part at a time, which can then be launched or "floated with safety in a complete state. Each part or section "of the dock is *composed* of three parts in the shape of parallel-

" opipedons, or in other convenient shapes, so as to form when
" combined a pontoon with side piers. Such pontoon or hollow
" dock bottom can be built and launched or floated before the
" hollow side piers are built, and such piers can then be built on
" the pontoon or hollow dock bottom without inconvenience,
" where required, even in a foreign country or distant place, as
" the pontoon can be made sea-worthy, and may be propelled by
" steam or sails to any place required, carrying the material"
" for building the side piers and other dock sections. When
" one or more such pontoons with side piers are completed, they
" will form an efficient dock for building other sections upon
" without any other accommodation, such sections being undocked
" and placed on end of those on which they were built until
" enough parts are together to form the dock of the dimensions
" required.

" One advantage in repairing such dock is that any complete
" part can be docked by the other parts, and repaired in an
" efficient manner."

" In repairing ships with a dock built in manner herein-before de-
" scribed, to facilitate the removal of a keel block or blocks, a great
" advantage may be obtained by the use of blocks on screw jacks,
" folding wedges, or hydraulic rams, which can be fixed and
" worked on either side of the place required to be repaired, by
" which means the ship can still be supported by the section or
" part of the dock which is merely forced down by such means,
" the tie bars, chains, or other securities being allowed freedom or
" being disconnected for the purpose. Great economy in the
" time required for lifting a ship is obtained by means of the
" water-tight deck which I use in the side piers, whereby the pumps
" can be worked for raising part of the water within the dock
" some time before the dock or parts of the dock are lifted with
" the ship; the water so lifted can be run out of the dock when
" everything is ready, and the dock is required to lift the ship out
" of the water, during which time the pump or pumps can be
" efficiently at work to assist to complete the flotation required."

According to the second part of the invention, "the pumps are
" so placed within efficient water-tight trunks that at no time is
" the water lifted higher than is necessary (as it is with pumps
" fitted in the ordinary manner) and should the pumps foul at any
" time, the pump trunk being fitted with inlet and outlet sluice

" valves or penstocks, which can be closed when required, the " trunk may be cleared of water by the opposite pump or a small " auxiliary pump on the same side, by which means the main " pump can be readily cleared or repaired in an efficient " manner."

[Printed, 10*d*. Drawing.]

A.D. 1862, July 1.—N° 1920.

GREENHALGH, Jesse, and GREENHALGH, James.—" An " improved diminishing valve, and also a water or steam escape " apparatus to give alarm in case of fire, and to assist in quenching " the same." The invention consists, first, in an improved diminishing valve. " We form the valve with two pistons, and " make in one a number of inclined slots. The valve works in a " pipe or cylinder forming part of the valve-box or chamber con- " nected to the steam or water pipe, and on the top of the valve " there is a spring, which is adjusted to any desired pressure by " a screw. When the steam or water is admitted, it presses against " the piston, on which the spring acts and brings the other piston " nearer the passage, so that the inclined slots shall give more " or "less opening, according to the pressure. Or we make the " valve with three pistons, and make inclined slots in two of them, " and weight the valve by a lever and weight."

Secondly, " in an improved self-acting fire alarm and water or " steam escape. We suspend a weight by a band of gutta percha, " cord, or other material that can be consumed by fire over a lever " and catch in connection with a valve on a pipe containing water " or steam, so that when the band is consumed the weight shall " fall on the lever and allow the valve to be opened for the " steam or water to escape, and thus quench the fire."

[Printed, 10*d*. Drawing.]

A.D. 1862, July 9.—N° 1972.

GIBSON, Thomas Cummings.—(*Provisional protection only.*)— " Improvements in the construction of ships and vessels for the " purpose of carrying and warehousing petroleum, palm oil, and " other oils or inflammable fluids."

The invention consists in building ships or vessels of iron, and of such a shape that the lower part of the hull, or the entire ship

or vessel, forms a large tank or cask to contain the petroleum, palm oil, or other inflammable substances either in a fluid or congealed state. In carrying or transporting petroleum and other oils or fluids, the tank is entirely filled, thus dispensing with the casks now employed for transport. These floating vessels should be moored in some convenient place where a sea-going ship with her cargo may go alongside; the petroleum may then be removed by pumps, syphons, or other means, out of the sea-going ships into the floating warehouses. The tanks or vessels must be provided with pipes for the escape of the air when loading, and to admit steam for dissolving palm oil or other substances when in a congealed state.

[Printed, 4*d*. No Drawings.]

A.D. 1862, July 11.—N° 2000.

MILLER, James.—"Improvements in apparatus for steering "ships and other vessels." "My apparatus consists of two racks, "each of which carries a vane or blade, which blades are free to "be protruded through the vessel's side, on one side or the other, "by communicating up-and-down motion through a toothed "wheel to the racks. The racks are so fitted with respect to the "wheel, that while one is raised to bring its vane within the "vessel, the other is lowered so as to cause its vane to be pro-"truded. The vanes may be set at right angles or at any other "desired angles with the side of the vessel, and they may be "fitted in the dead wood, or in any other part of the hull. In-"stead of racks, the vanes may be connected to a band or chain, "working over a drum or wheel, but I prefer the racks as above "described."

[Printed, 8*d*. Drawing.]

A.D. 1862, July 12.—N° 2006.

MENNONS, Marc Antoine François.—(*A communication from Jean Antoine Alexis Cambon de la Valette.*)—"Certain im-"provements in vessels mounted as floating batteries." The object of this invention is so to modify in certain points the construction and internal arrangement of vessels intended for floating batteries, as to permit the discharge of ordnance from below the water line, and the consequent direction of the projectiles towards the corresponding part of the enemy's ship.

The invention consists, firstly, "in a sub-marine port-hole "provided with a moveable obturator so arranged and connected "with the cannon as to open up when the latter is run into "position for firing, and to re-close under the action of the recoil "immediately after each discharge.

2. In "a moveable diaphragm of strong canvass or other "suitable material, serving as temporary mask to the uncovered "porthole, and giving passage to the projectile at each discharge.

3. In "a metallic flue or fire chamber leading from the porthole "to the deck of the vessel, and pierced at the back to admit the "barrel of a breech-loading cannon, so arranged as to fill up the "aperture in which it is set while sliding freely to and fro imme-"diately before and after each discharge."

[Printed, 10*d*. Drawing.]

A.D. 1862, July 14.—N° 2024.

FAWCUS, GEORGE.—"Improvements in building boats." The object of the invention is "the constructing of boats in such "manner that any number of boats of the same size will fit "one within the other. I dispense, if desired, with internal pro-"*jections*, and make the thwarts to fold, and support them by "an iron upright when shipped. I employ flat half round or "angle iron or iron plates to impart the necessary strength."

When the boats are stowed, the outer edges of the gunwale of the inside boat rest on the gunwale of the outside boat, one gunwale supporting the other; and so on, according to the number of boats stowed together. By this arrangement the boats are made to support one another, and all are maintained in shape. Portable rowlocks are inserted in holes formed in plates connected to the sides of the boats.

The boat is timbered in the ordinary manner, and a gunwale is formed inside over the top timbers. "Instead of the ordinary "end knees I use an iron strap outside and at the top of the "bows of the boat."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1862, July 17.—N° 2045.

APPLEBY, HENRY.—(*Provisional protection only.*)—"Improve-"ments in armour plates for ships of war, floating and land "batteries, and *other* like purposes." According to this inven-

tion the shield consists of an inner and outer layer of hammered iron or steel plates, with an intervening layer of timber. These three thicknesses are secured together by bolts having large conical heads projecting from the outer surface of the shield, and having nuts and screws on the inside.

The bolts are placed so near together that a shot would always strike their heads instead of the surface of the plates.

[Printed, 8*d*. Drawing.]

A.D. 1862, July 23,—N° 2096.

VIGNON, Alphonse.—(*Partly a communication from François Carlier.*)—" Improvements in the means and apparatus for extin-" guishing fires either on land or water." This invention consists, firstly, in the employment of a solution of carbonic acid gas in water, either at a high or at a low pressure, for extinguishing fires on land or on board vessels.

Secondly, in the construction and employment of apparatus, either portable or fixed, for extinguishing fires, in which a solution of carbonic acid gas in water is prepared and stored up, and whence such solution is ejected with the requisite force without the aid of pumps.

The improved means and apparatus, whether portable or fixed, may be with great advantage applied on board ships, particularly where they are divided into water-tight compartments; and they may, in such cases, be effectually made use of to check spontaneous combustion in the hold or other part of the vessel, by leading one or more tubes from the apparatus to such locality, and connecting them there to other tubes provided with numerous perforations, and arranged in a zig-zag manner over the space which it is required to protect. Then, if it is suspected that spontaneous combustion is taking place among the materials stowed in the hold, by opening the communication between the apparatus, containing the solution of water and carbonic acid gas at a high pressure, and the perforated tubes placed in such locality, the mixture will pass with considerable force through the perforated tubes, and the energetic action of the carbonic acid gas, together with that of the water, will immediately and effectually check the spontaneous combustion, and extinguish any ignited portions, and the carbonic acid gas, being considerably heavier than the atmospheric air, will displace the latter from that compartment of the hold,

and thus preventing the access of oxygen to the materials, will protect them from further spontaneous combustion.

[Printed, 1*s*. Drawing.]

A.D. 1862, July 24.—N° 2100.

LEETCH, JAMES, and MATHEW, BROWNLOW. — "New "and improved methods of protecting the surfaces of iron or "other metal work from oxidation, incrustations, or accumu- "lations of any kind, more especially in the cases of ships' "bottoms, steam boilers, and machinery." This invention is intended to be applied chiefly to metal ships, or to metal plates to be employed in the construction of ships, but it is applicable to metals and metallic surfaces generally; it consists in protecting the iron by means of a glaze or vitreous compound, or by means of glass applied as follows:—The iron is subjected to the action of dilute acid and cleansed by scouring. It is then placed in a furnace or otherwise heated to, say, a dull red heat. If in the state of plates or other suitable form, the iron is dipped in a bath of, or is coated with soluble glass, a silicate of potash or soda, or of both potash and soda; "any soluble glass may be used, but we "prefer that which is less basic in character. The plate is then "returned to the furnace, where it is exposed to such heat as will "not injuriously affect it, but will cause the" "surface to "vitrify and form a thin coating of glass (now become a double "or more complex silicate), and to closely adhere to or even to "impregnate the metal. This dipping or coating and exposure "in the furnace may be repeated as often as may be thought "necessary. In some cases we apply the heat by means of a "blow pipe or blast furnace or otherwise, and pay the soluble "glass over the heated surface, and again apply heat to cause "vitrification as before.

"In order in some cases to harden and improve the qualities of "the vitreous coating, we add to the bath of soluble glass, or "combine with the soluble glass so as form a paste of greater or "less consistence, all or any of the following ingredients, silica, "lime, alumina, baryta, talc, manganese, or other materials used "in the ordinary manufacture of glass enamels or glazes, in pro- "portions varying according to the properties to be imparted, for "instance, if colour be desired we add ochre, manganese, cobalt, "or other colouring matter. Sometimes we add silica or the other

"ingredients while the glass on the surface of the metal is in a "state of fusion; or we apply on the soluble glass when the "metal has been coated with it harder glass, or the ingredients "for forming harder glass. Sometimes we prepare the plates or "other metal surfaces by first covering them with simple soluble "glass vitrified as before described, a subsequent covering being "composed of the soluble glass combined with any or all of the "ingredients before named, for improving the qualities of the "glass. Or, in order to increase the resisting properties of the "vitreous coating, we cause it to assume a hard semi-vitreous or "de-vitrified condition or state similar to that known as 'Réaumur's "'porcelain' by either cooling it slowly from the melted state, "or, when ingredients have been added which render the mixture "less fusible, keeping the coated plate subjected for a compara- "tively longer period to a heat below that at which perfect fusion "of the vitreous materials would take place, and at the same "time below that temperature at which injury would accrue to "the iron. Soluble glass is not necessary to the production of "glass in the de-vitrified conditions above named, as, for instance, "bottle glass, or the ingredients used in its manufacture, may be "brought in manner above stated into such conditions upon the "metallic surface. If desired, we afterwards smooth or polish the "surface."

The invention "is performed under the second head, which con- "sists in fixing glass upon metal surfaces, with the interposition "between the metal and the glass of a composition which not "only serves as a cementing medium, but also acts as a soft "cushion for the glass. The composition we prefer is composed "of gutta percha, coal tar, and resin, but any other suitable "cement may be used. The composition may be applied to the "iron or to the glass, or to both. Supposing it to have been "applied to the metal, we proceed thus:—We heat the coating, "and apply thereon sheets or plates of glass previously bent or "shaped to correspond with the form of the metal to be covered, "and in some cases fashioned at back with corrugated or other "indented or rough surfaces, and having their sides by preference "bevelled or cut to overlap each other. The plates or sheets of "glass are pierced at intervals for the reception of screws or "bolts, which have been previously protected by means of glass "or of a glaze as herein-before described; the plates or sheets of "*glass are embedded* in the adhesive backing above named. In

" order to admit of the plates being screwed or bolted home we " fill the apertures for the reception of the screws or bolts with " the soft adhesive composition in order to form a bed for the " inner or under part of the screw or bolt heads to rest upon, " without coming in contact with the sheets or plates of glass. " We either fill up the interstices between the plates with glass or " vitreous compound fused under the blow pipe, or we stop them " up with cement or some composition similar to that in which " the sheets or plates are embedded."

[Printed, 4d. No Drawings.]

A.D. 1862, July 25.—N° 2115.

SEYMOUR, James, and HATCHER, Daniel George.—(*Provisional protection only.*)—"Improvements in steering ships, " and in apparatus for the same." The invention relates to " the " application of blades or surfaces to both sides of ships, for the " purpose of steering, either as an auxiliary to the ordinary rudder, " or in case it should be carried away. These surfaces we prefer " to place on each quarter of the ship at a sufficient depth below " the water line, and we recess them in the side of the ship, so " that when not in use they are flush and present no obstacle to " the passage of the vessel through the water." Each of these surfaces is mounted on an axis or pivot at the forward part, and has motion thereon similar to the action of the rudder; "this " may either be communicated through the axis itself or by a " curved bar fixed to the plate or surface and passing through a " stuffing box in the ship's side; the curve is described by a " radius, taking the pivot as a centre. Motion is communicated " to the curved bar by rack teeth and wheel gearing, or by levers, " or otherwise actuated by a steering wheel or suitable apparatus. " When it is desired to steer the ship by these blades or surfaces, " one or other is projected from the side of the ship, according to " the direction required, when the surface so projected presents an " inclined surface on which the water acts, as on a rudder itself. " The two auxiliary steering apparatus may be worked in com-" bination or separately; they may also be used for stopping the " way of a ship, in which case they must necessarily be discon-" nected, as they require both to be projected at" the " same " time. One or more of these steering surfaces may be fitted to " each side of the vessel."

[*Printed, 4d. No Drawings.*]

A.D. 1862, July 25.—N° 2116.

CLARK, William.—(*A communication from Louis François Rojare, and Louis Charles Edouard Rojare.—Provisional protection only.*)—"Improvements in rafts or structures applicable for the "ordinary purposes of marine and inland navigation, as also for "saving life in cases of shipwreck or otherwise." The invention consists in the use of a combination of hollow cylinders, whatever may be their form, and whether wholly or partially immersed in the water, forming the improved system of navigation by means of rafts.

"I propose to use hollow barrels or closed cylinders, each having "a longitudinal axis, which allows of their turning so as to obey "the least tractive force. Instead of having shafts running "throughout their length they may have pivots on each end "turning in a framework forming the raft. The number and "dimensions of these casks or cylinders may be increased accord-"ing to the power to be obtained; the cylinders are weighted "sufficiently to immerse them about one-third of their diameter, "and so leave their shaft pivots out of the water. The cylinders "support a raft of a size in relation to their number and dimen-"sions, and on this raft, which is made of suitable form accord-"ing to the purpose for which it is intended, is placed either a "house, a vessel, or magazine. The raft is supported by the "shafts running through the cylinders, which are thus free, and "represent large solid wheels. The axis of the cylinders may "also be carried by a frame on which the raft is established, so as "to allow of freer motion to the cylinders, which may be multi-"plied according to the power to be obtained; if they reach a "certain size they are fitted with several longitudinal water-tight "compartments, so that if one of the cylinders should be "damaged it would not endanger the whole of the raft; thus a "cylinder of about thirteen feet in diameter may be divided into "four parts, so that if an accident occurs it can only affect that "one part without preventing the cylinder from working, while "on the other hand such damage could be easily repaired."

"The rafts may be of any number, being supported by movable "cylinders working as wheels or rollers, and offering less resistance "to traction than the lightest vessel. When several rafts are "navigated together they are united by a bridge of the same "width as the raft, disconnected at the centre; this establishes

" the communication between each raft. The bridge is placed " about midway of the depth of the rafts, and also of sufficient " length to prevent the waves, however great they may be, " causing any shocks between the cylinders. The raft may be " driven at about the same speed as that of a waggon or carriage. " The application of steam for imparting rotary motion to the " cylinders provides for the greatest speed being attained, which " should be superior to that of the fastest walker."

"The improved apparatus for saving life from shipwreck is " composed of four casks, barrels, or cylinders, carrying a light " bridge; the cylinders are about three feet in diameter and " seven feet in length, connected together by two cross pieces " which carry the bridge, on which are two rails or elevations for " carrying the oars; the raft is steered by the oars without requir- " ing a rudder; the cylinders are furnished with shafts, and are " propelled by means of gearing set in motion by a crank in con- " nection with another series of wheels of similar dimensions."

[Printed, 4*d*. No Drawings.]

A.D. 1862, July 26.—Nº 2122.

NEWTON, Alfred Vincent.—(*A communication from Thomas Shaw*).—" An improved mode of attaching armour plates to ships." " The object of this invention is to effect a firm junction without " the use of exposed bolts between the hull and the armour " plates of war ships, and at the same time to increase the resist- " ing power of the armour plates. To this end the ship's hull is " covered to any required extent with thin plates, which are " secured by screws or equivalent means, and are so arranged as " to leave channels between their edges; over these are laid so as " to break joint other plates, which are applied plate by plate, " and by means of temporary backing pieces kept apart from the " first skin of armour plates. Between the inner and outer plates " fusible metal is run so as to form a slightly yielding backing, " which metal also fills the space between the edges of the first " or innermost skin of armour plates. The edges of the over- " laying lines of plates as they are applied are kept apart by " temporary filling pieces, and these places are closed by strips of " metal secured in position by clamping nuts. The fusible metal " is then run in between the inner and outer layer of plates, and " the plates are thus held firmly in position. The metal strips

"for confining the metal may be then struck off. A third skin "of plates is similarly applied, and so on until the required "thickness is obtained, which may require as many as six or "eight skins."

[Printed, 4d. No Drawings.]

A.D. 1862, July 28.—N° 2128.

BOLLINGER, HENRY.—"Improvements in machines employed "in ship-building, part of which are also applicable to other pur- "poses." This invention consists, first, "in an improved cutting "machine for cutting off the ends of angle iron or other shaped "bars, but chiefly intended for cutting off the ends of curved "ship's frames. I employ a water reservoir, and place upon it "one or more force pumps for forcing water through a pipe into "a hydraulic cylinder provided with trunnions or brackets, so "that it can be placed at any required angle. To the cylinder is "fitted a piston or plunger, to the upper end of which is fixed a "shear, which acts alternately in conjunction with one or other of "two stationary blades or shears fixed to the framework of the "machine. The pipe leading to the cylinder is provided with a "stop-off valve, and also a gland for keeping it tight."

When the cylinder is placed at the required angle and the shear in its lowest position, the bar to be cut is placed between the shears, and the stop-off valve shut. Water is then forced in the cylinder under the piston, so that it may be forced upwards and cause the shears to cut off the end of the bar. The stop-off valve is now opened, so that the water in the cylinder shall flow back into the reservoir. As soon as the communication between the cylinder and the pumps is cut off the operative throws a clutch into gear, which causes a worm to revolve and give motion to a worm wheel provided with a crank, connected by a rod with another crank keyed to the trunnion or bracket of the hydraulic cylinder. If the crank is turned a certain number of degrees it will place the cylinder, and with it the piston and shear, in a reverse position at any required angle, and by means of the link or rod the piston is forced back as soon as the end of the slot comes in contact with the stud, and expels the water back again to the reservoir. When the bar to be cut at the other end is placed between the fixed plate or shear on that side, the shear fixed to the piston, and the stop-off valve shut, then if water is pumped into the

cylinder, the end of the bar will be cut off on the opposite end of the first cut.

Secondly, in an improved blowing machine.

Thirdly, in improvements in rivetting machines for rivetting the beams and ribs of ships, and other parts which can be rivetted up before putting them in their places, and also for rivetting marine and other boilers, bridges, and metal girders.

This consists of a frame, upon which are mounted pedestals, supporting a shaft; upon this is placed a moveable clutch, which can be thrown in and out of gear with a corresponding clutch, forming part of an eccentric, which is loose on the shaft. To the eccentric shaft motion is communicated by means of a spur wheel, gearing into a pinion on the driving shaft, by means of a fixed pulley. On the same shaft are also mounted a loose pulley and fly wheel. The motion imparted by the eccentric is communicated to the slide containing the die holder by means of a connecting rod, which is of a peculiar construction, on the principle of the knee joint, and may be called a compensating or safety connecting rod. On each side above and below this rod there is a spring; these springs are held together by means of bolts and washers. As soon as a pressure acts greater than necessary to form a rivet head the springs will be compressed, and the rod shortened, and thus the machine relieved from excesive strain. "I also apply a "similar compensating apparatus to rivet making, stamping, "coining, and other machines, where an excessive pressure is to "be avoided." To the die holder, forming part of the slide, is mounted the moveable die or snap, which, in conjunction with the die or snap on the holder, forms the rivet head.

The machine is also partly self-acting, so as to throw itself out of gear as soon as the return stroke is completed. This is effected by causing a rod, fixed to the slide, to act upon a lever, which gives motion to another lever, and throws the clutch out of gear, when the machine will be ready for another stroke.

Fourthly, in an improved universal slotting and drilling machine, either portable or stationary. The portable slotting machine is for paring off the ends of ribs, beams, keels, and similar parts, either square or in an angle to their length.

This machine consists of a bed plate, upon which are mounted two brackets, provided with bearings, which support two other brackets, forming parts of a cast-iron table. Upon the driving shaft is fixed a fly wheel, provided with a handle. Upon the

same shaft is fixed a bevil wheel, which gives motion to a slotted disc in front of the machine. This disc rotates, and by means of a moveable crank pin and connecting rod, communicates a reciprocating motion to the slide or tool holder, which works in a dovetail groove. The disc is provided with a tooth or projection, placed in such a position as to set a cam in motion when the crank pin has reached its highest point. The cam gives motion by a rod to a ratchet wheel, for turning a screw or worm, gearing into a corresponding circular rack bolted to the table. This causes the sliding or moveable table to revolve, so that the tool may have the feed motion in a circular direction. This apparatus may be either portable, or stationary, or pulleys may be substituted instead of a fly wheel, so that it can be worked by motive power, and by adapting proper chisels or drills, it may be used for slotting, shaping, mortising, or drilling at any required angle.

Fifthly, in an improved double-acting shaping machine with revolving cutters to be used in constructing vessels and in constructing the machines before described.

Shaping machines have generally been made single-acting, and therefore the hollow spindle wears unequally in the bearings in consequence of the different pressure. These difficulties are obviated in the improved double-acting machine constructed as follows:—The cast-iron standard or frame is provided with suitable bearings and slides. To the first shaft are keyed cone pulleys and pinions, which transmit motion by means of geared wheels, to the hollow spindle, carrying cutters at each end, which are fixed to a spindle by means of keys. The machine is provided with compound slides, with vertical and horizontal adjusting motion, as well as horizontal feed motion.

[Printed, 3*s*. Drawings.]

A.D. 1862, July 29.—N° 2149.

DEVLAN, Patrick Sarsfield.—(*Provisional protection only.*) —" An improved composition to be employed for covering pro-" jectiles, and the internal and external surfaces of vessels; which " is also applicable to the manufacture of tubing and to other " useful and ornamental purposes." The improved composition consists of "an admixture and combination of paper or other " fibrous pulp, caoutchouc, or gutta percha, and any resinous " gum; plumbago may also if required be mixed therewith the

"proportions I prefer being about eight pounds of fibrous pulp "to half a pound of caoutchouc or gutta percha, and one pound "of resinous gum, although such proportions may be varied "without materially differing in effect. The composition has "great durability, tenacity, flexibility, and lightness."

[Printed, 4*d*. No Drawings.]

A.D. 1862, August 2.—N° 2190.

GRAY, JAMES.—"Improved arrangements for cleaning ships' "bottoms, and for preventing the fouling thereof."

The invention is founded "on the well-known fact that when "the asteroida, mollusca, and cirrhopœda (which are the kinds "of shell-fish usually found upon ship's bottoms), at first attach "themselves to the ships' bottoms they are in a soft gelatinous "state, and can be easily scraped or brushed off," and the invention consists "in taking advantage of these circumstances by cleaning "the ship's bottom continuously or at short intervals, and in "providing conveniently available means for" effecting "such "continuous or intermittent cleaning either whilst the ship is "sailing or whilst it is in port."

The cleaning instrument is a brush, the bristles or wires of which may be set obliquely outwards on opposite sides of the brush, so as the better to throw off adhering matters in whichever direction the brush may be moving. Thin blades of metal or other strong elastic material may be substituted for the bristles or wires, such blades having a scraping or skimming action. The brushes or scrapers may be made flexible or elastic, or be fitted upon a flexible or elastic material, so as to accommodate themselves to inequalities or curvatures in the surface of the ship's bottom. The cleaning instrument may also be contrived to follow the cleaning action by the application of a coating substance, which, if fluid, can be supplied to the instrument by means of a flexible tube from the deck.

The brush is drawn along the ship's bottom and side by a rope, which starting from a winch on deck passes to the stern, and turning over a pulley there, descends to a pulley on one side of the stern post. Turning round this pulley the rope proceeds to the brush, and is continued from the other side thereof towards the stem, where it passes round a pulley, and up to a pulley at the *top of the stem; the* rope then descends on the other side of

the ship, and is arranged to actuate a second brush on that side in a similar way, being finally led back from the top of the stern to another barrel on the winch. When one end of the rope is being wound up on one barrel, the other end is payed out from the other barrel, and the necessary tightness or tension of the rope is maintained by the application of a friction strap to the paying-out barrel. The winch is worked so as to draw the brushes backwards and forwards from stem to stern, and vice versâ; the brushes on the opposite sides always moving in opposite directions. The brush only cleans a narrow strip of the vessel's bottom at one traverse, but its line of action is shifted at each traverse, so that the entire surface is eventually acted upon. The requisite alteration of the line of action is effected by raising or lowering the guide pulleys, at the stem and stern, and these pulleys are raised or lowered by means of screws, or by means of endless ropes or chains.

"Guide grooves or rails may be formed or fitted along the "ship's side and dividing the under-water surface of the ship "into one, two, or more longitudinal strips according to the size "of the vessel; and flexible brushes or scrapers extending verti-"cally or transversly from one guide to the other may be drawn "along by ropes from one end to the other. Or, again, the "arrangements may be modified so as to give an up-and-down "or inclined movement to the brushes or scrapers, instead of "a longitudinal one, with provision for gradually moving the "brushes or scrapers from one end of the ship to the other as "the cleaning operation proceeds."

"In the case of steam vessels, or in that of vessels having "steam apparatus on board for winding and hoisting purposes, "the cleaning details can easily be worked by the steam power."

[Printed, 10*d*. Drawing.]

A.D. 1862, August 6.—N° 2208.

JOHNSON, John Henry.—(*A communication from Filip Bergendal.*)—"Improvements in the construction of armour plates "for ships and forts, and applicable to other like purposes." The invention consists in making armour plates of several laminæ, but in lieu of connecting the whole of such plates together by bolts passing through the entire series, it is proposed to couple

only the contiguous ones. Thus, if four plates or laminæ be employed, the inner one will be bolted, rivetted, or otherwise secured to the second, which in its turn is similarly secured to the third; this plate is secured to the fourth or outer plate, and so on throughout any desired number of plates or thicknesses.

[Printed, 8*d*. Drawing.]

A.D. 1862, August 7.—N° 2214.

BROOMAN, Richard Archibald.—(*A communication from Donald Bethune*).—" Improvements in ships and vessels in order " to prevent injury from collisions." The invention consists in placing from the bow to the stern of the ship or vessel (like a belt), a plate or plates of iron, steel, or other similar material, about ten inches in width, more or less, and about five inches in depth or thickness, more or less, at the centre of each plate. The plates may be made in any suitable manner, and they should be placed outside of the ship or vessel, upon the planks (or plates if the ship be of iron) which are against the main or upper deck or beams of such ship or vessel, so as to have the support of such deck and beams in resisting a blow from another vessel. Where the ship or vessel is large, and the main or upper deck is high above the water, " I apply another belt or set of plates of iron, steel, or " other similar material, to the ship at the deck next below the " main or upper deck, as above-mentioned, from the stem to the " stern thereof. Some very large ships may require a thick belt " or set of plates at the second deck below the main or upper " deck, and between such belt or plates and the sides of the ship " or vessel, I place in some cases india-rubber or gutta percha the " width of such plates, and about a quarter of an inch in thick- " ness, more or less, to prevent injury to the sides of the ship by " corrosion."

[Printed, 8*d*. Drawing.]

A.D. 1862, August 7.—N° 2215.

BROOMAN, Richard Archibald.—(*A communication from Donald Bethune.*)—" Improvements in covering ships and vessels " built of wood, or iron ships, with a backing of wood before " placing iron, steel, or other armour plates on such ships and " vessels." This invention consists in placing india-rubber, gutta

percha sheets, or other similar material between the iron, steel, or other armour plates, and the wood beneath them. The ship or vessel is covered, wherever it is to be iron or steel plated, with such sheets of about an eighth of an inch in thickness, more or less, so as to prevent the armour plates from coming in immediate contact with the wood of the vessel, thereby preventing an injury to the wood or to the plates, and also preventing the water from lodging between the india-rubber or gutta percha sheets and the wood of the vessel. The sheets of interposed material may be attached to each other and to the wood, by the cement or preparation used in connecting india-rubber or gutta percha to the soles of boots and shoes. The plates may be a little heated before being put on. The joints or spaces between the sheets of india-rubber may be filled up with liquid india-rubber, and a hot iron passed over such joints to make the sheets adhere to each other, and to prevent the water from getting between the india-rubber and the wood of the vessel, and the liquid india-rubber may be placed under the joints of the iron plates.

[Printed, 4*d*. No Drawings.]

A.D. 1862, August 8.—N° 2221.

JENNINGS, Francis Montgomery.—" A composition for " coating ships' bottoms to prevent fouling." " I propose, for " coating the bottoms of ships, or boats, or buoys, whether of " timber, iron, copper, zinc, Muntz metal, or any kind of sheathing " or coating over any of those, whether or not previously painted, " varnished, or otherwise prepared to use paraffine, Japan wax, " bees'-wax, or the wax of insects, or vegetable waxes, spermaceti, " or napthaline, or such other hydrocarbons, purified or other- " wise, alone or mixed with tallow, fats, stearine, or any animal or " vegetable fats, common rosin or oil, or any of their constituents. " Either of these substances may be used alone, or they may be " used, when mixed together, in any proportions, or one and all " of them may be used mixed together with petroleum, pitch, tar, " asphaltum, resins, gum-resins, rosin, shellac, gutta percha, india- " rubber, or other such resinous matters, or any of the oils dis- " tilled therefrom. With any or all of the above first-named " substances, or their mixtures or combinations with substances " afterwards named, I may combine or mix" creosote, " carbolic " acid, or any pyrogenous acid, alcohol, or ether, or organic

" poisonous matter, or any poisonous metal, metal oxide, or salt, " or any substance used as paint, either alone or in combination."

" Any poisonous substance or substances, whether organic " (such as creosote or carbolic acid) or mineral in the shape of " metal, or metallic oxide, or acid or salt in powder, or any sub- " stance used as paint, or plumbago or ochre, &c., may be mixed " with any of my compounds in fine powder, the latter being " used principally for the purpose of giving body to my com- " pounds or compositions, and when added for such purposes " only I prefer using the non-poisonous substances, such as " plumbago, ochre, &c."

[Printed, 4*d*. No Drawings.]

A.D. 1862, August 13.—N° 2274.

TURNER, GEORGE.—(*Provisional protection only*.)—" Improve- " ments in fastening armour plates of ships." " In fastening the " armour plates of ships I prefer to form the plates with two lon- " gitudinal ribs throughout their length, such ribs to be some " little distance from the edges of the plates, and of about four " inches in breadth and one or two inches in thickness, that is to " say, they project about two inches from the back surface of the " plate. In these ribs I bore holes for the reception of the bolt " ends or heads; these holes being bored from the inside and sunk " to about the thickness of the rib do not enter the general sub- " stance of the plate or detract from its strength." " The holes " so bored I undercut, that is to say, enlarge inwards to a conical " form the shape which the bolt head or end is made to assume."

" Instead of ribs being formed on the plates, bosses or thick- " ness pieces may be welded on in the positions required for the " bolts, or the undercut holes or recesses may be made in the " body of the plate itself." " In this case I sink the holes about " 1¼ or 1½ inches in depth. The ship's side being prepared to " receive the ribbed plates, that is, with grooves into which the " ribs fit, the bolts are driven through from the inside, the bolt " being a rod of iron fitted with a screw nut or other means of " fastening inside the ship, while the head part has saw cuts made " in it, but which otherwise is of the form of the round bar of " which it is formed. Before inserting the bolt, the point of a " cross wedge is inserted in the saw cuts, and fixed therein by a " small pin; the bolt is then driven through the ship's side into " the recess or hole in the plate; the cross wedge retains its

"position until it comes in contact with the bottom of the hole, "where it stops. The bolt is further driven home, so that the "cross wedge opens out the saw cuts and swells the end of the "bolt out to fill the enlarged internal form of the hole, and which "assuming a conical form therein it cannot again be withdrawn, "as any force applied to draw it out brings the wedge with it, and "so keeps the bolt end of the enlarged conical form it has "assumed; the bolt so inserted and fixed in the plate is then "screwed up by its nut or otherwise fixed, and so on the several "bolts are inserted throughout the area of the plate."

[Printed, 4d. No Drawings.]

A.D. 1862, August 14.—N° 2287.

MARQUES, Don Pelegrin.—(*A communication from Antonio Blanco y Ramis.*)—" Improvements in apparatns for cleaning the "bottoms of ships and vessels." "This invention consists of "improved apparatus whereby the bottoms of ships and vessels "may be cleaned and freed from corroding matters, without the "necessity of taking the ships into dry docks."

"The apparatus is formed of two metal foundation plates, one "of which supports two cylinders and pistons, the other being "provided with a strong brush or scraper; these plates contain "also a space enclosed by a sheet of india-rubber or gutta percha, "which space communicates with a force pump on the deck of "the vessel by means of india-rubber tubes.

"The piston rods from the cylinders are attached to the brush "or scraper, and the cylinders are supplied with compressed air "from the pump by means of tubes, by which means a lateral "reciprocating motion is given to the brush or scraper, which is "pressed firmly against the sides of the vessel by means of the "pressure of air in the space enclosed by the india-rubber."

"The apparatus is to be suspended from the deck of the vessel "by a rope or chain, and a vertical reciprocating movement may "thereby be communicated to the apparatus, in order to perfect "the operation of cleaning or scraping the bottoms of ships and "vessels."

[Printed, 10d. Drawing.]

A,D. 1862, August 18.—N° 2316.

NEWTON, William Edward.—(*A communication from Valentin Lasserre.*)—" Improvements in connecting plates, sheets, or

"slabs of metal or other materials, and fastening the same on to "framing, applicable to armour plating for ships, or vessels, or "batteries, and to roofing and other similar purposes." This invention relates to a novel method of fixing sheets of metal for armour plating for ships, or vessels, or for roofing or constructing railway carriages, and other purposes to which such metallic covering may be applicable. The improved system of fastening consists of screws or bolts fixed in the wood or iron that forms the framing to be covered. These screws or bolts pass through a hemispherical cap, which is thereby screwed down tight on to the plates and forms a water-tight joint. The plates to be joined are provided at their point of junction with cup-formed projections fitting into each other, and of the same shape as and fitting into the cap above-mentioned. The plates having been laid over one another at the joint, and the caps applied, the screw is passed through a hole made in the cap and the projecting parts of the plates. The head of the screw may be bevilled, in which case the head of the cap is tapped for the reception of a screw cap, which hermetically closes the opening.

Instead of having cups or projections on both metal plates, the upper one only might be so provided; a small metal plate somewhat larger than the base of the cap is therefore welded on at the opening for the screw, so that the cap may press equally upon its whole surface. By this arrangement of parts water cannot enter the joints either of the screws or the cups, and consequently the roofing or covering will by this system of joining be perfect.

[Printed, 8*d*. Drawing.]

A.D. 1862, August 27.—N° 2377.

LINDSAY, George.—(*Provisional protection only.*)—"An im-"proved mode of arranging and disposing guns in ships employed "in naval warfare and otherwise." This invention consists "in "arranging and disposing guns in ships in the following manner, "that is to say, instead of placing the guns of ships above the "water line of the ship's draught, as commonly practised, I "propose to place and employ them below the water line, and to "use them for attack or destructive purposes as a substitute for "the ram now employed."

... circular hole through the ship's bows, and fit therein ... say, six feet long or more, said pipe having a

" flange formed thereon for connecting said pipe to the mouth of " a gun, either breech-loading or otherwise; the aforesaid pipe is " surrounded by a stuffing box placed inside the ship to enable " said pipe to slide water-tight therein. A plug is used at the " outer end of the aforesaid pipe to exclude entrance of water " thereinto, and a slide valve placed at the inner end of said pipe " being let down immediately on the discharge of the gun, " excludes the water also from said gun. The gun is mounted " on wheels for advancing same forward. In using a gun thus " arranged, the pipe aforesaid is caused to protrude through the " ship's bows, so that when the mouth of said pipe comes into " contact with an opposed object the pipe will be pushed back, " and operating on mechanism, will discharge the contents of the " gun, thus rendering such discharge of the gun self-acting."

[Printed, *4d.* No Drawings.]

A.D. 1862, September 5.—N° 2454.

SAMUEL, David Arthur.—(*Provisional protection only.*)— " Improvements in apparatus for steering vessels." " I propose " to reverse the tiller of the rudder by making it 'point aft' " instead of 'fore,' as is usual, the end of the tiller being pro- " vided with a vertical pin and roller which acts in a groove cut " in a double-action lever; this lever works on a centre pivot, and " is forked at its fore end, so as to receive a block of metal to " slide in slots, through which block a screw works, being set in " bearings on each side of the deck, thus when motion is imparted " to the screw by means of the steering wheel, the block and lever " are brought from the centre of the ship to the side required, " and consequently the rudder is turned accordingly by the other " extremity of the lever, the greater power being gained where " most required, the difference in the leverage being greater as " the rudder is moved towards either side. The steering wheel " may either be attached " to " the end of the screw at the side " of the ship, or may be placed in the centre of the deck, bevelled " wheels being employed to actuate the screw."

" In some cases I propose to dispense with the double-action " lever, and pass the screw through a block working in a slot " formed in the end of the tiller itself."

[Printed, *4d.* No Drawings.]

A.D. 1862, September 9.—N° 2479.

MAURICE, JOSEPH.—(*Provisional protection only.*)—" Improve-" ments in the construction and preservation of ships and vessels." These improvements relate, first, to additions to be made to the sides of vessels, whether new or old. " I form around the sides of " a ship or vessel or attach to the outside thereof a solid, partially " solid, or hollow belt, which may be divided transversely as well " as longitudinally, and should be fixed about the light load water " line to give increased buoyancy or ability to carry armour " plating for vessels of war, or to enable ships to carry additional " weight, applied externally or internally, whether such ships be " for commercial or war purposes. By this means increased " strength is given to the hull and increased resistance offered to " rolling, rendering such ships or vessels safer in a sea-way. The " belt may project from stem to stern, or as far forward as " to the beak of an iron-plated vessel, so as to give increased " buoyancy to the bow. By the application of the belt around " the sides a protection is formed against the butting of a 'ram,' " as the first shock of contact will be broken thereby."

Secondly, to protecting the hulls of ships and other vessels. To protect the iron surfaces of ships and other vessels, " I deposit, " by galvanic, electric, or chemical action, copper or other suitab e " metal from a metallic solution. This I effect upon the exterior " surface of a completed vessel in a suitable dock or basin con-" taining the metallic solution, or upon the interior surface of " such vessel, by placing the solution within the same and setting " up the necessary action or agency in the usual manner. In-" stead of acting upon the entire surface at one time, I prefer, in " some cases, to form the protective coating by a series of opera-" tions, by means of suitably-shaped vessels applied to the surface " to be operated upon, the contact of each vessel in the shape of " a box or case being made perfect by an elastic edge, which is " capable of conforming to the irregularities of the surface to be " operated upon, the metallic solution being held within it. A " series of the plates or parts of the vessel may be electrotyped " or coated with metallic deposit previous to being rivetted " together, and the joints or joinings, or any other unprotected " parts may afterwards be coated " separately in the manner described.

[*Printed, 4d. No Drawings.*]

A.D. 1862, September 15.—N° 2533.

TIZARD, WILLIAM LITTELL.—" Improvements in the con-
" struction of ships, vessels, cupolas, and forts, and in apparatus
" employed therein." These improvements consist " in the con-
" struction of the hulls of ships or such parts as may be required,
" cupolas, and forts, of slabs of iron or steel, or both in one
" mass, by welding together the materials necessary for their
" construction in situ."

" The principal conditions, plant, and processes necessary for
" carrying out this invention consist of,—1, tough iron or steel
" slabs or plates forged of suitable thickness." " 2, the usual
" stationary and portable templates, showing the configuration of
" the work to be executed. 3, the progressive erection of strong
" and roomy stages, both inside and outside of the intended hull
" or carcase, or other work, on which are placed tramways for the
" transit of trucks, locomotive fire cages, and hammers; the latter
" made so as to deliver their blows on the plate to be welded in
" any required direction. 4, planing machines, by which the
" edges of the slabs or other work are ' bevilled off,' ' squared
" up,' or serrated, so as to lock into each other and be expe-
" ditiously and equably fused, at a depth not greater than one-
" tenth of an inch, which is found sufficient to make a sound
" joint. 5, portable coke fires of great purity and intensity,
" occasionally accelerated by oxygen gas, and capable of being
" instantaneously moderated, increased, and directed towards or
" removed from their work. 6, portable steam hammers travel-
" ling on the tramways, also screw and wedge presses, with which
" to bring the fused metals together. 7, suitable guides to keep
" the welding parts in true position while under the influence of
" the steam hammer;" " 8, intervening cushions or striking
" blocks, with serrated and plain fans, to protect the outer edges
" of the slabs from injury by the hammers, wedges, or screws.
" 9, vertical and horizontal steam and gas mains connected with
" their respeetive boilers, and gas holders with branches leading
" to the fire cages, blow pipes, hammers, and hoisting gear, fitted,
" where necessary, with connexions of flexible hose, jointed pipes,
" cocks, and unions. 10, blow pipes for the delivery of pure
" oxygen, and also carburetted hydrogen and oxygen, of sufficient
" power to weld seams two feet thick and fifty feet in length.
" 11, fire-bricks, known as ' lumps ' to close the back, ends, and

" other openings in the joint during the application of the coke
" and gaseous fires."

The inventor then proceeds to describe the improvements made in the apparatus and in the formation of the necessary joints, by which his invention may be carried into effect. The following example is given, among others, of the mode of working the invention in making and welding butt joints. Sufficient materials having been prepared, the gas-holders charged, fires lighted, and all things made ready for uniting the iron materials, " I will
" proceed to make a butt joint by welding two or three slabs
" together at their serrated ends." " The first slab is a little
" elevated, set on its edge, and firmly fastened to a bed plate.
" No. 2 slab is fastened on a truck also at its edge, with its front
" end projecting a foot or two over the truck towards No. 1, and
" its other end furnished with a cushion; this truck runs on a
" pair of V-shaped rails. The front end of No. 2 slab is run up
" into the end of No. 1, and adjusted to fit it and run back from
" four to six inches. A horizontal steam hammer follows on
" another truck until its head touches the cushion; in this place
" the truck wheels are scotched. Fire-bricks and lumps are
" placed at the back and on the top of the gap thus formed by
" the ends to be united, and other open places where it is desirable
" to keep the heat in. On the pair of rails in front of the work,
" one or more fire cages sends forth its caloric into the gap during
" a few minutes, or until the metals are white hot, or nearly so,
" to the depth of about an inch, when its oxygen gas is turned
" off, if it has been in use, fan stopped, and the fire truck moved
" to the right or left so as to be out of the way of the men in
" charge of the blow pipes; these are now made to play with or
" without carburetted hydrogen on all parts of the serrations a
" few seconds, or until they are equably fused, when in obedience
" to a signal the steam hammer pushes No. 2 slab, truck and all,
" forward; thus the metals are welded together, and a few rapid
" blows from the steam hammer make the joint. The men with small
" hammers trim up the exuding metal and the joint is finished.
" The work is now propped up, the truck released and loaded
" with No. 3 slab, which is welded on to the end of No. 2, as
" before described, and so the work progresses with facility and
" rapidity, until the required length of a man-of-war's keel, for
" example, is constructed in one piece."

" *I am aware that so long ago as* 1854 *it was proposed to build*
" *iron ships in one piece by welding sheets of metal together with*

" lap joints. Afterwards either 'sheets or plates' were to be used " in the construction of 'steam boilers, bridges, and ships,' so " that it is fair to presume that the ordinary ship plates of the " day were designed to be used and no others, especially as no " allusion was made to the application of the plan to war vessels, " which require not sheets but slabs of metal of treble the thick- " ness of any made 8 or 10 years ago." " A lap joint is unex- " ceptionable when applied to ordinary work, and particularly to " the welding together of sheets or thin plates of iron, which " require seams in one direction only, such as girders and small " steam boilers, for example, because these being unattached " during their manufacture, and having unbound ends and sides, " are free to lengthen and widen by the absorption of all the " spare metal supplied by this doubling of their substances; " besides the protruding metal at each end of the seam consequent " on the hammering out of some of the additional metal in those " directions can be cut off and the work trimmed up. It will be " seen, however, that such a joint is unsuitable in the erection of " consecutive tiers requiring a succession of horizontal, vertical, " and oblique seams, such, for instance, as iron forts and war " vessels," because there would be either unsightly excrescences at the welds or a buckling of the plates. But in making butt joints of slabs of any thickness no such failures can occur, because such descending slab embeds itself directly into the place assigned to it without contributing more fused metal than is sufficient to seal the slabs together in a true and substantial manner.

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1862, September 16.—N° 2544.

LAKIN, Robert.—(*Provisional protection only.*)—" Improve- " ments in the mode of plating or shielding ships of war." These improvements consist, firstly, in applying springs between the plates or shields and the sides of the ship, to act as an elastic cushion to the plates.

" Secondly, in supporting the plates or brackets or the like " attached to the sides of ships instead of bolting the plates to " the sides.

" Thirdly, in applying to the sides of ships metal pipes or tubes, " or metal bars made wholly or partially of a circular or other " curvilinear form, instead of the plates as ordinarily used."

[Printed, 4d. No Drawings.]

A.D. 1862, September 18.—N° 2561.

MOORE, George Storey.—(*Provisional protection only.*)—
" Improvements in ship-building." This invention has for its object improvements in ships having iron frames and wood planking. In such ships "I prevent the copper fastening" of the planking " from coming in contact either with the angle iron or " with the bilge water by surrounding its upper end with another " metal which has not the same prejudicial action on the iron; " this I do by forming the hole in the angle iron, which is to " receive the fastening, of somewhat larger diameter than the " fastening, and inserting into it a tube of the protecting metal, " which also extends a short distance into the wooden planking. " This tube has a flange at one end which lays against the angle " iron, the fastening is passed through the protecting metal tube " and the wooden planking, and is secured beyond by placing a " ferrule or washer on it and clenching it. The head of the " fastening within the vessel is then covered with a cap of the " protecting metal, the edges of which are soldered all round to " the edges of the flange of the tube before mentioned. This " preservative metal employed should be one which will not itself " act injuriously on the iron and which solders readily."

" In applying wooden planking to an iron frame it has been " usual to butt the ends of the planks together; each of the butt " joints" has been made to come over one of the ribs, and the two ends, butting together, have been fixed to the same rib, which has been widened at this part by a butt strip rivetted to it, but " I make the ends of two planks, where they meet, to lap the one " over the other for a distance somewhat exceeding the space " between the ribs, and I scarf the ends together, that is, I reduce " the width of the planks where they overlap, one half. I arrange " the joints so that they shall each fall correctly over two of the " ribs, and I fasten the end of each plank to each of the ribs, by " preference, with fastenings such as herein-before described. " In order to make the whole more secure I drive a bolt down " vertically through the joint and intermediate of the ribs into " the plank below."

[Printed, 4*d*. No Drawings.]

A.D. 1862, September 26.—N° 2624.

PETTET, William.—(*Partly a communication from William Stiles.—Provisional protection only.*)—"An improved covering for

"protecting vessels and forts from shot, shell, and other warlike "missiles." The invention consists in protecting the exterior of vessels, and of forts and batteries, from being broken or penetrated by warlike missiles, by covering the exposed parts with an armour composed of boiler plate iron, and an intermediary elastic filling, in such a manner that the armour will be sufficiently elastic so as to produce the resisting quality required without breaking, and at the same time avoid the greater weight incident to the use of thick armour plates. In order to produce this elastic or indentible armour it is proposed to introduce a layer or filling about eighteen inches or two feet thick, composed of vulcanized or other gum, hemp, cotton, wool, oakum, dried grasses, fabrics of cocoa nut hulls, sawdust, tan, or any other similarly compressible or elastic material, or several of them together, packed tightly in between the vessel's outer walls and continuous outside plating of thick boiler iron, the latter to be secured to the frame of the vessel by means of long nutted screw bolts, so that the said intermediary packing or compressible and elastic stratum can be more tightly compressed and firmly held together by means of nuts on the ends of the screws, should any tightening of the filling be required after the packing is completed. The same process is applicable to the inclined roofs or decks of gun boats and other vessels and defences of all kinds. It is intended to extend the armour specified down below the water-line of vessels and water batteries. In addition to this armour, it is intended to further protect the outside iron plating by heavy quilts of either of the aforesaid elastic substances, to be suspended from the bulwarks of vessels or the tops of forts and other defences over said iron plating or covering, so as to be readily replaced as occasion may require.

[Printed, *4d.* No Drawings.]

A.D. 1862, September 29—N° 2638.

GRIFFITHS, Robert.—"Improvements in the construction of "iron ships, and in the method of fastening metal sheathing "thereon to keep them from fouling." The improvements consist in having strips or bars of iron or other suitable metal secured with screws or rivets along the longitudinal joints of iron ships, having rabbets or recesses on each edge of them, so that strips of wood or other suitable material can be inserted, so as to caulk and secure the joints, and keep the water from coming in contact

with the joints and rivets or passing through the joint in the skin of the ship. When the ship is built with one row of plates lapping over the other, or what is generally termed 'clinker built,' the strips or bars in that case will only require to have the rabbets or recesses on one edge, the recess on the other edge being formed by the bar being placed as much over the edge of the plate as will be required for the wood or other caulking material to be inserted. "When the iron ship is to be sheathed with metal "sheathing, I coat over those parts which are to be sheathed "with marine glue or other suitable adhesive material that is a "non-conductor of electricity, and also the metal sheathing, "which may be sponged over with an ordinary suitable solution, "such as is used for marine glue; or the sheets of sheathing "may be made hot (to make them and the non-conducting "materials stick together) just before the sheathing is put on it. "The sheathing is then nailed along its edges to the wood, or "the material that is in the rabbet or recesses of the iron strips "along the joints of the ship. When the iron plates in the skin "of the ship are wider than it would be desirable to have the "sheathing sheets, I then put longitudinal strips of iron, with "a recess on each edge of them for inserting the wood in along "the middle of such plates to secure the sheathing to. When "the sheathing is secured to the strips of wood that are in the "recesses of or formed by the iron strips or bars, I then cover the "strips or bars with sheathing metal nailed to the wood strips "along the edges; or the longitudinal strips or bars may be "covered with a thicker metal than the sheathing, so as to clip "the edges of the sheathing sheets, and secure the wood strips in "the recesses of the longitudinal bars. The strips of covering "metal I propose to secure to the wood strips with metal screws, "so that they can be readily removed when the sheathing is to "be replaced. In such iron ships where it is not necessary to "caulk the joints, as already stated, I put longitudinal narrow "cleats of wood at suitable distances, to which I nail the sheath-"ing in a similar way to that described when iron strips with wood "inserted on each side are used."

The sheathing metal which covers the longitudinal strips or bars, the bars not sheathed, and the nails or rivets employed to attach the sheathing metal to the sheets of bituminous material, may be of different metal or quality to the sheets of sheathing metal employed to cover the other surfaces of the iron ship or

vessel, in order to cause galvanic action to take place between the two distinct metals thus combined, and giving to the sheathing metal cleansing properties caused by the wearing away of its surface.

[Printed, 10*d.* Drawing.]

A.D. 1862, October 4.—N° 2679.

MUNTZ, WILLIAM HENRY.—(*Provisional protection only.*)—" Improvements in armour for the protection of ships of war and " other vessels and fortifications from the effects of cannon shot " or other projectiles." The invention consists in protecting such vessels of war and fortifications, by means of armour composed of elastic material, which absorbs instead of resisting the force of the projectile, and stops it gradually instead of suddenly. This elastic armour may be made either of a solid elastic substance, such as vulcanized india-rubber, or of hollow cases or mattresses of vulcanized india-rubber, or other similar material, stuffed or filled with cotton or other elastic or compressible substance, which may be rendered incombustible by chemical means; or the cases or mattresses may be filled with atmospheric air, either compressed or otherwise. The edges of the mattresses or cases should be made in the form of a scarf joint, so that they overlap each other, and still preserve an even surface on the exterior. This elastic armour may be provided with ropes or chains, so that it can be lowered over the side of the vessel or fort when required; or if the exterior is formed of a material capable of resisting the elements it may be fixed permanently in its place.

[Printed, 4*d.* No Drawings.]

A.D. 1862, October 6.—N° 2693.

KEECH, THOMAS.—(*A communication from James Hyde.*)—" Improvements in floating batteries." This invention consists in the employment, in combination with any kind of ship's hull or body, of a floating turret, so arranged as to float in water or any other suitable fluid, contained within the ship's hull, or in a compartment formed therein. All friction from the usual supporting mechanical devices is thus avoided, and the turret can be easily turned by hand power in lieu of steam power. " By thus " dispensing with all the machinery and engines now used to " operate the turret in this class of batteries, I am enabled to

" construct my hull with the adaptation to greater speed and sea-
" worthiness than can be obtained when the heavy turret is not
" floated, and is operated in the manner heretofore practised."

It will be understood that by leaving the turret to float as described, the careening of the ship will not affect the turret so much, the tendency of the water in the reservoir being to maintain its level, whereby the turret is made to float always nearly level, however much the hull may be inclined, whereby a greater degree of accuracy can be obtained in firing the guns than can be arrived at in the present mode of construction.

2. " In forming a communication between the inside of the
" ship and the inside of the turret by a suitable passage way
" through hollow frames which sustain the central shaft and
" through the said shaft."

3. In a novel arrangement of the guns on curved railways, by which the guns " are made to travel on circular railways about in
" the shape of a quarter of a circle, the carriages being con-
" structed with suitable sector frames, which are hung at one end
" on pivots fastened to the deck around which the carriages
" travel. By this arrangement less space is required for the guns,
" and consequently a greater number of guns can be arranged in
" one turret, and capable of being fired directly opposite each
" other. Suitable elevators or dumb-waiters are arranged in the
" turret through which the ammunition is passed up from the
" lower decks of the turret to the guns, as may be required."

[Printed, 10*d*. Drawing.]

A.D. 1862, October 9.—N° 2722.

MAURICE, JOSEPH.—(*Provisional protection only.*)—" Improve-
" ments in steering ships or vessels, and in the apparatus to be
" employed for that purpose." " These improvements consist in
" substituting for the ordinary rudder, or as an auxiliary thereto,
" a sliding, traversing, vibrating, or partially rotating surface of
" metal or wood, mounted or fitted so as to work within a sheath
" or case, and capable of being projected into the water from the
" ship's sides, port or starboard, according to the required change
" of the ship's course. The projection or motion of the steering
" apparatus should be at or about an angle of 90° with the line
" of keel, that is, the steering piece (or pieces if there are two),
" or the surface of iron or wood projected from the ship into the
" water, may either be moved out and in horizontally, vertically,

"or at any intermediate angle thereto, as it may be found most "convenient to fit or apply the apparatus to the ship; but the "surface opposed to the water, and to the ship's progress, is "intended to be at or about a right angle with the longitudinal "axis of the ship's course, and with the keel of the vessel.

"The apparatus may be placed at or near the stern of the ship, "amidship, or in any other convenient position, and the sheath "or case may be inserted wholly or partially into the ship's side "or bottom, or may pass" through it.

[Printed, 4*d*. No Drawings.]

A.D. 1862, October 9.—N° 2727.

HAMMOND, Robert.—(*Provisional protection only.*)—"Improvements in armour for ships of war." This invention consists of a novel construction of iron or steel armour for ships of war, the object being to dispense with the present solid armour plates, and to substitute armour of a less weight, possessing greater resisting power, and costing much less than plate armour.

It is proposed to construct, either by rolling or otherwise, a series of bars of iron or steel, the interior or central part of the bar being hollowed out for the purpose of receiving the head of a bolt. These bars are arranged in rows one above the other, and between each two rows another row of smaller bars is to be adjusted. The larger bars are shewn to be about as wide as they are thick, and the smaller ones not quite so thick, and of about half the width of the larger ones. A transverse section of the faces of these bars is nearly parabolic but is sharpened at the apex. The bars are bored diametrically, in order to permit a series of bolts, or a continuous bolt or key, to pass through them, and through the heads of the horizontal bolts, which are bored accordingly. The smaller bars are so constructed as to be held firmly between the larger series without the use of bolts.

A layer or coating of vulcanized india-rubber, from two to four inches thick, is to be placed between the armour and the teak or timber, in order to form a soft, yielding, or elastic surface for the iron, and to lessen the shock of projectiles upon the armour.

[Printed, 6*d*. Drawing.]

A.D. 1862, October 10.—N° 2740.

ANDERSON, Thomas.—(*Provisional protection only.*)—"Improvements in the construction of ships or vessels." This

invention relates to the arrangement and construction of ships or vessels suitable for merchant service, and, under other modifications, for vessels of war. Under one arrangement, as adapted for a passengers ship or for carrying freight, the improved vessel consists of two hulls arranged parallel, the inner face of each hull forming a vertical line in the same manner as if an ordinary hull were cut asunder longitudinally, and the open part of each half were shut in by a level facing of timber. These hulls are arranged at some distance asunder, and are connected together by a deck, above which is built another deck, and the sides are enclosed in the usual way. In the channel formed between the two hulls is fitted a central paddle wheel, and outside the hulls are fitted two other paddle wheels in the ordinary position. These propellers may be used either conjointly or otherwise, according to the speed at which the vessel is required to be driven. At the fore part of the vessel is built a cutwater, which is pendent from the under side of the lower deck. In passenger vessels the central part of the upper deck is occupied by a saloon, whilst the space outside forms a promenade. The long narrow wedge-like form of the duplex hull admits of these vessels being driven at a great speed which is readily obtained by the increased propelling surface. In conjunction with the important advantage of superior speed, these vessels are much safer than those of the ordinary kind, and not so liable to founder should they come into collision with another ship; they are also much steadier on the water, and less liable to roll. These vessels may also be fitted with a screw propeller at the stern of each hull in lieu of the outside paddles, these propellers being worked in conjunction with the central paddle They may also be rigged as sailing vessels, and from the firm hold which the duplex hull has upon the water they are adapted for carrying a much heavier press of canvas than could with safety be borne in a vessel of the ordinary kind. Vessels of this construction may be readily adapted for vessels of war by dispensing with the outside paddles, and forming the sides of the ship, between the decks, of metal plates angularly disposed. The great width between decks would afford every facility for fighting guns of the largest calibre. On the upper deck cupolas or other similar shot-proof structures might be arranged as found desirable.

[Printed, 4*d*. No Drawings.]

A.D. 1862, October 15.—N° 2782.

POPE, William.—" Improvements in coating the sides of ships, " batteries, forts, or other places, with defensive armour plates." " My invention has for one of its objects the presentation of the " edge of metal or other material to the missile, and I propose to " attach my defensive armour either longitudinally with the ship's " side and following the shape of the vessel, or vertically with " similar provision." " I propose to take a sheet of metal, say, " from half an inch to an inch in thickness, of any length, and of " twelve inches wide or thereabouts; on this I place a layer of " wood or other material of the same dimensions or nearly so. I " propose to fit these to the side of a ship shelfwise, the inner " edges following the curves of the ship's side, bows, and counter. " On and under I continue placing alternate layers of wood and " iron (or other metal) till I shall have covered the vessel (or any " part thereof that it is desired to render impervious to shot or " shell). Suppose the shelf at the water line to be twelve inches, " those above and below may be gradually lessened in width so " as to taper upwards or downwards, or both, and this applies " where my invention is used in a vertical position. To obtain " lightness consistent with strength, the portion of the sheets of " metal and wood nearest the ship's side may be perforated with " holes of any size or number, say, to one half the breadth of the " plate, and these perforations may serve for the insertion of rods " or pipes of metal, such rods or pipes being made to fulfil the " duty of attaching the mass to the ship's side to bind it together, " and as regards the pipes to act" as "ventilators. The mass pre- " senting a surface of lines in wood and metal alternately, caulking " may be performed previous to sheathing in the usual manner, " or felt, caoutchouc, or other elastic or semi-elastic material may " be laid in between the sheets of metal and wood while the mass is " fitting together, and it may be sheathed in the ordinary manner, " as the edges of the wood will receive and retain the ordinary " fastenings. It will be observed that the outer face of this defen- " sive armour presents no bolt heads or other inequalities to the " action of shot, the whole appearing, when sheathed, as a solid " and smooth-sided metal ship." The fastening for each plate or shelf is obtained by passing it over the ribs, corresponding holes being made in the plate or shelf for that purpose, or grooves may be left on each side of the rib to receive tenons to be made in the plate, or *vice versa*, the tenon being on the rib, and the slot or

open part in the shelf or plate; or, "the inner portions or edges " of the metal and wood may, if for strength it be found desirable, " dovetail with a vertical iron bar or extra rib of such substance " as may be found sufficient to tie the plates well together." The inventor also describes, but does not claim, an umbrella plug for stopping shot holes in this armour.

[Printed, 4*d*. No Drawings.]

A.D. 1862, October 16.—N° 2797.

HUMPHRYS, Edward. — "Improvements in steering appa- " ratus." This invention has for its object "improvements in " steering apparatus, and consists in so combining apparatus for " acting by hydraulic power on the rudder of a ship or vessel " that the hydraulic cylinder and other apparatus intermediate of " it and the rudder may be all below the line of floatation, and " consequently out of the way of shot. For this purpose an " arm or projection is fixed to the rudder sufficiently below the " water line to protect it from shot. This arm is suitably con- " nected to the piston rod of the hydraulic cylinder, which is also " situated below the water line of the ship or vessel. A stuffing " box is formed through the stern of the ship or vessel for the " passage of the piston rod or of a connecting rod, so that the " communication between the piston of the hydraulic cylinder " and the rudder may be water-tight. The arrangement for " working the hydraulic pumps and apparatus may be according " to the means at present in practice or otherwise."

"In ships built with very low overhanging 'counters,' in place " of passing the piston rod of the hydraulic cylinder through a " stuffing box, as above described, the spindle of the rudder may " be passed through a stuffing box, packed in the usual manner " to make it water-tight, and the hydraulic cylinder together " with the parts connected with it is then placed above this stuff- " ing box, but still below the line of floatation of the vessel, the " piston rod of the hydraulic cylinder being by preference con- " nected by a connecting rod directly with an arm on the rudder " spindle."

[Printed, 10*d*. Drawing.]

A.D. 1862, October 16.—N° 2798.

RANSFORD, Henry.—" Improvements in building ships and " other vessels." *This* invention consists in carrying the floor of

a ship or vessel, whether flat or with more or less dead rise, laterally beyond a perpendicular dropped from the outside of the timbers at the water line, so that the ribs or side timbers slope upwards and inwards from the floor timbers to the deep load water line, or beyond, as advisable. A ship may advantageously be constructed on this principle, even one-fourth or more wider at the floor or bottom, than at the deep load water line at the extreme beam, but whatever slope or angle is adopted at that point it should be diminished towards the stem. It is preferred that the stem itself should slope backwards or aft from where it is joined to the keel, to enable the floor to be carried well forward. A square applied to any part of a ship's side, so constructed, from the extreme beam to the stem, the side of the square projecting from the vessel, would in no part be below a horizontal line. The part of the ship from the extreme beam to the stern post has to be modified accordingly, but it is preferred to carry the floor much further aft than is at present adopted in sea-going vessels.

In applying rudders to very long ships and vessels, as are now built, especially to such as are constructed as above explained, "I "prefer to have one rudder near the stem, but under the keel or "bottom of the ship or vessel, on a shaft or axis passing through "the bottom, provision being made for the rudder shaft or axis "passing through a trunk or tube rising inside the ship above the "water line as has before been proposed. The rudder is to be "affixed to its shaft or axis so as to extend forward and aft "thereof. A similar one can be used at the after part of a ship, "and by this means both rudders in a ship of war are out of all "danger from shot, and can be worked separately or together, or "in conjunction with the ordinary rudder."

[Printed, 4*d*. No Drawings.]

A.D. 1862, October 16.—N° 2800.

ROBINSON, Joseph.—"Improvements in protecting the sub"merged portions of iron ships, and in ventilating the cabins and "cabin decks in iron ships." The improvements in protecting the submerged portions of iron ships consist in covering the outer skin from the keel to a little above the load-water line, with teak or other hard wood, and in fixing upon the wood thin copper plates. "I bend the frames at the sides, at those parts where the

" wood covering ceases, so as to form a recess" " to receive the " wood, and I continue the outer skin" " of the upper part of " the hull some distance down to cover the wood, to enable me to " make a tight seam to prevent water entering between the wood " and iron skin." At that part of the hull, and to a little below the level to which the wood is carried on both sides, there are three thicknesses, viz., the outer plating or skin carried down from the top sides of the ship, the wood, and the skin or plating which continues down to the keel. In the drawing the wood is shown in one thickness, and the upper edge of the copper sheathing is in contact with the lower edge of the outer skin.

The improvement in ventilating the cabins and cabin decks in iron ships consists in carrying an air pipe down through the upper deck or waterway to a little above the waterway on the cabin deck; in carrying a pipe into, or forming apertures in the under part of the upper waterway, and in leading uptakes from the latter points to a funnel or shaft. The air pipe is fitted with a cowl with a bell or other shaped mouth, which can be turned to regulate or entirely shut off the supply of air through the pipe. Fresh air enters to the lower part of the cabins or cabin deck through this pipe, while the vitiated air rising to the upper waterway (which is itself a hollow trunk or receiver) is drawn off into the funnel or shaft.

[Printed, 8d. Drawing.]

A.D. 1862, October 21.—N° 2839 (**).

TOLHAUSEN, Frederick. — (*A communication from Jean Jerome Rancurel. — Provisional protection only.*) — "An im- " proved machine for raising, lowering, removing and carrying " buildings, monuments, and ships or vessels."

" This machine consists of a skeleton frame or scaffolding, " built all round and underneath the building, ship, or other " heavy body to be moved. The part of said frame that is under- " neath is made moveable, and the other part is stationary. The " moveable part is fitted with a number of nuts, into which work " screws that are driven by double or treble worm and wheel gear " so as to produce the power required for lifting the heavy body " by means of the screws aforesaid; said heavy body is then " placed on rollers or casters to be removed to its final place of " destination."

[Printed, 4d. No Drawings.]

A.D. 1862, October 22.—N° 2841.

CLARK, GEORGE.—(*Provisional protection only*).—" Improve-" ments in the construction, protection, and armament of ships, " vessels, and floating batteries, some of which improvements are " applicable to land batteries and forts." According to this invention it is proposed, firstly, that the stem and stern shall be constructed with iron beams, angle bars, and plates arranged diagonally from the extremities of the stem and stern to points on the side of the vessel, about one-fourth the distance, more or less, of the entire length from each extremity.

The same principle is carried out by diagonals from the decks down to the keel, so that the two ends of the vessel are angulated, in every direction, namely horizontally, from the extremities of the stern and stem to the lines at the sides where the taper of the vessel ends, and vertically, from the extreme outer points at the centre of the stem and stern at each deck to points in the keel, and to the beams of the decks below. Strong iron beams or girders are to be fixed as abutments to the longitudinal and diagonal iron beams or girders, forming braces on the line of each deck between the iron bars or beams on the diagonal lines of the stem and stern, the beams or girders, and the sides of the ship. The outer surfaces of the stem and stern, thus arranged, are to be formed of plates rivetted to the beams and girders and to frames inside, as well as to the skin plates of the sides of the ship. " I " mean that the angulated extremities thus constructed shall be " substantially the frame and body of those parts of the ship, in " order that they may derive their strength from the rectangular " and diagonal bearing of the beams or girders in straight lines " without any bend or curve; and I therefore intend that these " extremities shall be made watertight and complete in every part, " as if they were the outer structure of the vessel bearing on the " water; but I propose that outside these angulated extremities " the ordinary iron shell of the bows and stern of the vessel shall " be constructed of plate and angle iron, forming cells and a " water-tight skin outside the inner structure."

The principle features of the plan for constructing and arranging the gun deck are as follows:—Instead of fixing the armour plating outside the sides of the vessel, " I place it inwards from each " side a distance equal to about one-fourth of the extreme width, " *and a distance* from the extremity of the stem and stern equal

" to about one-fourth of the extreme length. This mode of " armour plating may commence with the lowest strake under the " water line, or at the gun deck." It is proposed to place bars, beams, or girders diagonally from the sides of the ship at the lower deck beams, or thereabouts, to the under side of armour plates on the deck above.

It is intended in constructing ships or batteries of great strength, for the purpose of resisting the crushing force of heavy ordnance, to cover the outer as well as the inner sides of the ship or battery with armour plates, and fill in the space between the two sides solid with iron angle bars or girders, and wood or other filling. " In all cases where I use wood as filling in armour-plated " structures, I propose to render it incombustible by saturating it " with alum or a metallic sulphate, or other substance which " shall also preserve the wood and prevent its corrosive action on " the iron. I propose that the stern and bows be protected with " armour plates a few feet above and below the water line. I " cover the armour-plated fighting deck with a bomb-proof " roof," "which may be provided with a parapet outside the " fighting deck." "I construct a raised deck" "up to nearly the " muzzle of the guns, forming a commodious gangway outside " and all round the fighting deck."

There are also projecting armour-plated lunettes or gun shields at the extremities of the raised decks or outer gangways, armed each with a pivot gun as a protection against boarding by sweeping the decks or firing into boats alongside; demilune gun shields projecting from the line of the armour-plated sides of the fighting deck to increase the range and facilitate the training and depression of the guns; turntables for training the guns to the required range; and revolving turret heads, which cover and protect the guns and the tops of the shields. Each of these turret heads revolves on its own centre, independently of the wall or sides of the gun tower or shield of which it is the roof, aud is supported by, or fixed to the platform or turntable on which the gun revolves or traverses, so that the turret head turns with the gun, its outer edges underneath travelling on rollers. An opening in the turret head forms the embrasure to the gun, turning with the muzzle in the segment of a circle. By this rotary action of the turret head, the opening in it which forms the embrasure may, after the gun is discharged, be turned inwards, so that the port will be closed, and need not be opened again until the gun is to be trained for firing.

For the purpose of obtaining the results produced in the manner above described by the rotation of the turret head or upper part of a shield with the gun and the carriage or platform on which the gun is fixed, " I propose another plan, namely, to cause the " shield itself, or a part of it below the head or upper part, to " rotate with the gun and its carriage or platform, the head or " upper part being fixed and stationary. In this arrangement " the part of the shield which it is intended should rotate with " the gun will be securely fixed to a turntable or revolving plat- " form, on which the gun will stand with the muzzle projecting " through an opening in the revolving part of the shield, such " opening being the embrasure, so that in training the gun the " shield and the gun will rotate together, the head remaining " stationary."

There are also arrangements for converting the level raised deck or gangway into an incline, and lowering the bulwark in front of each gun so as to facilitate its depression; for sliding portcullises or revolving turrets, on the plan already described, intended as sally ports, which may be readily opened and closed for the egress and ingress of the crew from and into the fighting deck; and for lighting and ventilating the lower deck through skylights fixed in the gun deck between the guns. The apertures for these skylights are closed when a ship goes into action, and are protected by means of iron shutters, sliding, or opening and shutting with a hinge.

[Printed, 1*s*. Drawings.]

A.D. 1862, October 23.—N° 2857.

PERKES, MATILDA CARTWRIGHT ASTON.—(*A communication from Samuel Perkes.*)—" An equilibrium double-action revolving " rudder, self-balancing drag, and improved steering gear." This invention has for its object improvements in " the " form, construction, and arrangement of ships' rudders and " steering apparatus, whereby greater power, strength, and " rapidity of action may be obtained with less manual labour than " with the ordinary methods now in use. For this purpose I " construct the rudders of double their ordinary widths, and " insert the rudder post in the middle, which thus forms a " vertical central shaft or axis, on which the double bladed rudder " *is made to* revolve when in use. The foot of this central shaft

" is supported on proper bearings from the keel, and the stern of " the ship is slightly undercut or recessed, so as to receive the " rudder and allow it freely to revolve as described. The upper " portion of the central shaft is continued through a well-hole to " the deck, in the ordinary way, and supported by proper bearings, " made portable by preference, so as to be capable of immediate " removal for any required purpose. On the rod of this shaft I " fix a horizontal spur wheel, which is set in motion by a suitable " pinion " in connexion with the steering wheel. " I provide an " indicator of similar form to the rudder, and paint it some con- " spicuous colour, with points exactly to correspond with its " direction, so that the true position of the rudder can always be " seen on deck. The steering wheel I also provide with one or " more suitable fastenings, so that it may be instantaneously and " securely locked in any required position.

"This rudder I make of any suitable material, but prefer it of " metal; it will form a very powerful self-acting drag on the ship " at any required moment by 'letting go the wheel,' the mo- " mentum of the ship will thus instantly swing this double-bladed " equilibrium rudder at right angles to the ship's course.

" I do not confine myself to the exclusive use of my improved " steering gear for working my equilibrium double-action revolv- " ing rudder, as I have so simplified its construction that the " common steering gear as now in use can be applied to it for " giving it motion, but it would not be so powerful or efficient " as the new steering apparatus I have invented and herein " described."

[Printed, 1s. 4d. Drawings.]

A.D. 1862, October 24.—N° 2864.

BURMEISTER, Carl Christian, and WAIN, William.—(*Provisional protection only.*)—" Improvements in the construc- " tion of 'cupolas,' and in apparatus connected therewith for " naval or other war purposes." This invention has for its object improvements in the construction of " cupolas " for protecting guns and gunners when in action, and in the arrangement of apparatus connected therewith for naval and other war purposes.

" The shield or exposed parts of 'cupolas' for protecting guns " and gunners we prefer to construct entirely of metal (by pre- " ference iron or steel), in one or more layers or thicknesses, and

"of hemispherical form. The shield has a series of 'ports' "formed around it suitable for the muzzle of the gun to pass "through, each port being furnished with doors or slides to close "or open the same when required, and other port holes may, if "desired, be formed in the shield suitable for hand rifle firing. "The crown of the 'shield' is covered by a perforated metal "plate to afford protection and ventilation, and rotary movement "is communicated to the 'shield' by suitable mechanism (ac-"tuated by hand, steam, or other motive power)," "the whole "being mounted so as to rotate around a central hollow axis. An "inverted hollow ring is fixed on the outer circumference of the "'cupola' or 'shield,' near its base, which overlaps the vertical "rim of another ring fixed on the deck or floor of the battery, "in order to prevent the introduction of gunpowder or other "explosive or destructive matters.

"The gun or its platform may be arranged to rotate on a cen-"tral pin or axis within the shield, independently thereof if "desired."

[Printed, 10*d*. Drawings.]

A.D. 1862, October 28.—N° 2897.

CHALMERS, JAMES.—(*Provisional protection only.*)—"Im-"provements in armour plating ships of war and fortifications." According to this invention the backing for the armour plates is to consist of a frame of the following description:—A plate or plates of iron of about an inch in thickness is to form the bottom of this backing frame, and to the said plates is to be attached, longitudinally, vertically, or diagonally, ribs of iron half an inch in thickness and nine inches in width, all more or less, the said ribs to have a T or angle edge for attaching them to the plates, to which they shall be attached at right angles and about six inches apart. The spaces between the ribs are to be filled with timber or some light and compact substance, so that the timber or other substance will be flush with the outer edges of the ribs, and thus form, with the ribs and bottom plates to which the ribs will be attached with rivets or otherwise, a backing frame for the support of the armour plate. In cases where great strength is required there are to be cross ribs inserted between and at right angles to the ribs aforesaid, thus forming the backing frame into cells, which

may either be left empty or filled with timber having the grain at right angles to the bottom of the backing frame or otherwise, or the cells may be filled with some other light and compact substance. But in either case the plate or bottom of the backing frame is to be placed towards the ship and farthest from the armour plate. In the case of ships built of iron, timber planking of about four inches in thickness, or some other elastic or yielding substance, is to be placed between the backing frame and the skin of the ship, in order to lessen the rigidity of the combined bodies. In fastening the armour plates to the sides of a ship, the backing frame is to be first placed against the ship, and is to be bolted thereto independently of the fastenings of the armour plates. The armour plates are then to be placed against the backing frame, and are to be fastened through the backing frame to the ship by means of bolts and nuts. The heads of the bolts are to have stepped conical necks with three steps, more or less, which necks are to fit into corresponding holes in the armour plates, so that the shoulders or bearings of the several steps of the necks may prevent the bolts from being driven through the plates when struck on the heads by projectiles. In cases where through bolt fastenings would be injurious, as in the case of narrow plates or otherwise, the armour plates are to be fastened to or through the backing frame by fastening bars of two inches in thickness, more or less, which bars are to be placed between the edges of the armour plates, the outer corners of the edges of which are to be chamfered, and the outer edge of the fastening bar is to be provided with a T or longitudinal head corresponding with the chamfer in the edges of the armour plates; these fastening bars to be about ten inches in depth.

In order to secure the said fastening bars to the ship, bolts with T heads are to be let into a notch in the inner edge of the bars, which notch is to correspond with the width of the T head of the bolt. The end of the T head bolt is to be secured with a nut as in the case of the through bolts afore mentioned. The said notch is to be about one inch deeper in the lengthway of the bolt than the size of the head thereof, so that there may be a space between the head end of the bolt and the metal of the fastening bar, in order that when a projectile strikes the fastening bar opposite a bolt it may not communicate the jar to the bolt through the fastening bar.

[Printed, 4d. No Drawings.]

A.D. 1862, October 28.—N° 2904.

DUNCAN, CHARLES STEWART.—" An improved compound or " material for coating or covering metallic and vegetable substances " to preserve them from corrosion or decay." The invention consists of an improved composition for coating metals, woodwork, or vegetable or animal bodies or substances of various natures, in order to preserve them from the decaying action of the atmosphere, or of water, acids, saline or earthy matters, or generally from any influence which would otherwise cause corrosion, oxydation, or decay.

"The compound is applicable for protecting and covering " sheathing of all characters, girders, bridges, balconies, or iron- " work of all kinds, when exposed to destructive influences as " above, and it should be applied to the surface of the iron or " other metal previous to the applicatiou of paint or varnish.

" The compound is also applicable to the coating or preserving " of metallic work of other kinds, such as to iron, steel, zinc, " lead, tin, and copper, or the various alloys of metals; to wire " and wirework of every description; and with respect to vege- " table bodies, it is well adapted to coating and preserving wood " and woodwork, such as piers exposed to sea water, or to " wharves;" " to palings, railway sleepers, and telegraph posts, " previous to their being coated with paint, varnish, pitch, or tar," and to " ropes or strands of hemp, or to any fibrous or textile " materials or fabrics."

" The material or compound is to be made as follows:—I pro- " pose to use marine glue, gutta percha, india-rubber, shellac, " copal, mastic, vegetable or mineral pitch or tar, or resin, or " iodine, or sulphur, or creosote, or asphalte bitumen, and coal " tar in combination with one or more of the following sub- " stances:—Alumina, schist, quartz, slate, silex or flint, marble or " pozzolano, sand, sandstone, cement (natural or artificial), chalk, " glass, emery, tripoli, white oxide of zinc or of lead, or the " litharge or red oxide of lead, in every case reduced to a fine and " nearly inpalpable powder, in proportions varying from one- " fourth part to five parts of these powdered materials to one " part or more of the before-mentioned plastic substances. The " materials are then to be heated so as to reduce them to a plastic " or semi-liquid state, and I also heat the metal or metals to be " coated with the compound to a moderate temperature, and

" while in this heated state I lay on the coating with brushes or " by any convenient method. Immediately after the coating has " been laid on the metal, wood, or other body to be preserved, " and before it is allowed to cool, the compound is to be covered " with a layer of one or more of these mineral powders before-" mentioned, in a warm plate, in order to entirely remove all " stickiness or tack. When the compound has become cool, the " surface may be brought to a smooth or polished exterior by " rubbing it with any ordinary substance used for rubbing down " or polishing mineral or metallic surfaces. In cases, where neces-" sary, I propose to give the metals or woods a further protective " coating or varnish composed of copal, cupreous, or other varnish, " or naptha, paraffine, camphine, petroleum, or other mineral or " vegetable oils, or silicate of potash, or of soda and sulphuric " acid, mixed with one or more of the above-named pulverized " substances. The coatings may be repeated if it is desired to " obtain extra thickness and protection.

" These mineral earthy substances must in all cases be " thoroughly washed and freed from impurities and then be kiln " dried to desiccate and destroy vegetation. For a very hard coating " the substance should be composed of seven or eight parts of " silica, or pozzalano, or chalk instead of silica, to four parts of " mineral pitch or tar and two parts of vegetable or Stockholm " tar."

[Printed, 4*d*. No Drawings.]

A.D. 1862, October 30.—N° 2932.

HORTON, Joshua.—(*Provisional protection only.*)—" Improve-" ments in the construction of armour-plated ships and fortifica-" tions." In constructing armour-plated ships I form the ship " with hollow ribs or frames as has before been proposed in the " Specification of a Patent granted to Alexander Samuelson, and " dated the 12th February last, N° 373, but in place of applying " thereto armour plates, having flanges which are butted together " and lodged within the hollow ribs or frames as is there pro-" posed, I employ armour plates having no flanges, but which " are recessed at their edges; these plates are held in their places " by T pieces, the head of each T piece lapping over the edges of " two adjoining plates, and fitting the recesses so as to make a " flush surface; the stems of the T piece enter and are secured " within the hollow ribs or frames.

"The ends of the armour plates are arranged so as not to come "directly one under the other, but the joints are distributed as "uniformly as possible over the whole of the ribs or frames, and "the hollow ribs or frames where they are not required to receive "T pieces, are closed in by the ordinary skin of the vessel under "the armour plate.

"In order to prevent the ends of the armour plates from draw-"ing out from their fastenings, I form the bottom of the recesses "at the ends of the plates with grooves, and I make the heads of "the T pieces with corresponding projections to lock into these "grooves.

"In some cases in place of forming the frame of the ship as above "described, I make it in an ordinary manner and rivet to it the "plating to form the skin, and to secure the armour plate I "employ T pieces as before, but the stems of these T pieces are "made to come intermediate of the ribs or frames, and their "stems project through apertures formed for them in the skin, "and are inclosed and fixed in boxes or troughs rivetted to the "skin."

"In applying armour plating to wooden ships," "recesses are "cut in the wood to receive the stems of the T pieces, or these "stems may be dispensed with, so that what was the T piece "becomes only a coupling piece held in its place by bolts through "it and the frame of the structure; this system may also be "adopted when the frame of the structure is not of wood."

[Printed, 4*d*. No Drawings.]

A.D. 1862, October 31.—N° 2945.

SINIBALDI, MARIE CELESTE DE CASTERAS.—"Improvements "in the manufacture of armour plates for ships, fortifications, "and forts, and in the manufacture of plates to be used in the "construction and building of ships and for other purposes, and "for attaching copper or other like protective metal to the out-"side of metal plates for making copper bottoms or bottoms "with a similar protection to iron ships." The method of constructing armour plates for building ships of war is to use laminated plates, combining iron and steel, and also plates of iron without steel, perfectly wrought, and to unite them by soldering with copper, brass, or other metal in the manner described. To procure great strength laminated plates of steel and iron are used *in combination*.

" Plates for building ships for the merchant service are manu-
" factured in like manner, but with thinner plates. By the same
" means I produce all other formation of iron for machinery,
" beams, and other purposes."

By the process described an external coat of copper, or other like protective metal, can be given to each plate of iron, which, when the plates are used in the construction of ships, will produce the effect of copper bottoms.

[Printed, 1s. 10d. Drawings.]

A.D. 1862, October 31.—N° 2950.

SICKELS, FREDERICK ELSWORTH.—" Improvements in the
" means of steering and manœuvring ships or boats, and in the
" apparatus connected therewith, which apparatus is also applicable
" for pumping and lifting weights." The invention consists " in
" improvements upon that kind of steering apparatus in which
" steam or other fluid under pressure is employed for the purpose of
" actuating the rudder, my object being to ensure increased effi-
" ciency and security in steering and manœuvring vessels. The
" apparatus for working the steering gear is also applicable for
" various other purposes, such as for pumping, or lifting weights.
" When any great degree of rapidity in turning and manœuvring
" steam vessels is required, a forced draught to the furnaces (to in-
" crease the propelling power) should be combined with ample me-
" chanical power to operate a large rudder. The steering engine
" is made to disconnect from the steering apparatus, and to connect
" with a hoisting drum, thus saving the room occupied by a
" separate hoisting engine for loading and unloading the vessel.
" When fresh water is required an apparatus can be used to con-
" dense the steam that operates the steering apparatus, thus
" obtaining fresh water for the ship's company. If the steering
" apparatus be placed below the steam boiler, which supplies it
" with power, a trap or other mechanism should be used to dis-
" charge the condensed water either into tanks or overboard.
" To ensure the use of the least possible power required to operate
" the steering apparatus the valve or valves which admit the
" steam or other fluid under pressure to the working cylinders
" is so connected with the steering apparatus that while the
" steersman by turning the steering wheel opens the valve to
" admit steam to the cylinders so as to cause the rudder to move,

"the steering apparatus in moving will give this same valve or "valves a closing motion, and thus modify the extent of the "opening of the valve, and the rapidity of admission of the "steam or other fluid to the working cylinders. The power to "move or hold the rudder is transmitted through an adjustable "friction brake or connection so as to limit the power trans-"mitted from or to the rudder. The friction is produced by "bringing two surfaces into contact with an elastic pressure, "which if any undue power be employed will yield, and prevent "the machinery from being strained. The steam or other fluid "employed to actuate the steering apparatus and rudder is con-"ducted through a valve loaded to regulate its pressure, and "thereby prevent any undue force being applied to the steering "apparatus, and a suitable stop should be provided to prevent "the steersman from causing the rudder to move too far either "way. In case of a separate boiler being used to actuate the "steering apparatus a small pump should be attached to the "steering apparatus to supply that boiler with water, which "pump when not so employed may be made use of as an ordinary "ship's pump.

"In order to instruct the steersman at all times as to the posi-"tion of the rudder a wheel with different marks corresponding "to the different positions of the rudder can be used to control "the application of the power. These marks may be made "sensible to the touch by being made either in relief or in "intaglio, and thus the steersman by feeling the different marks "will know without looking at the wheel the exact position of "the rudder."

"The steering engine can be placed so as to carry the engine "shaft directly to a pinion that gears into a cogged arc upon the "rudder head, or the engine may operate through any of the "ordinary hand-steering gear now in use."

The eccentric employed is shifted so as to work the engines either way by means of a spiral cam that engages a pin in the eccentric, and as this cam turns it draws the pins in the slots in a plate, and thus shifts the eccentric from full throw in one direction to full throw in the other direction, and by reversing the movement of the spiral cam, a reversed motion of the eccentric and a reversed motion of the engines are produced. The slots have a V-shape in the middle, which is a good form if steam or *other elastic fluid* is used, as it tends to leave the pressure of the

fluid in the cylinders, so that it acts in opposite directions upon the crank as the engine comes to a state of rest, and thus prevents the constant oscillation of the pistons from the action of an elastic fluid in the cylinder that might ensue if the slots were straight and guided the centre of the eccentric direct from one side of the centre of the shaft to the other, as it was shifted by the movement of the pin moving in the spiral cam. If an incompressible fluid, as water, is used, the slots can be made straight, with advantage in the accuracy with which the engine will follow the motion of the spiral cam in either direction. As the spiral cam is turned to open the valve, the engine and steering apparatus, in moving, carries round the eccentric to close the valves, and the extent of the effective opening of each valve will depend upon the closeness with which the motion of the engine follows up the motion of the spiral cam, and this closeness will be regulated by the amount of resistance offered to the steering apparatus, and the demand for power as the rudder is being moved by the engines. Thus the motion of the steersman will operate to draw the pins to one end or the other of the slots, while the steering apparatus operates to draw them to the middle as it moves the pin in the spiral cam in the same direction that the spiral cam is turned by hand.

[Printed, 3s. 6d. Drawings.]

A.D. 1862, November 3.—N° 2966.

TRACHSEL, Frederick, and CLAYTON, Thomas.—"Improvements in machinery or apparatus for obtaining light, heat, "and ventilation, parts of which improvements are also applicable "to other purposes." The invention "consists in various im-"provements upon an invention for which Letters Patent were "granted to us, dated the Fifteenth day of March One thousand "eight hundred and sixty-one, N° 652. The said invention was "entitled 'Improvements in the Manufacture of Gas, and in the "'Apparatus employed therein,' and consisted in certain improve-"ments in the mode of obtaining light, and in the apparatus for "rendering atmospheric air, hydrogen gas, carbonic oxide and "other gases of various kinds luminous, and in charging and "impregnating them with matters of a volatile nature, so that "the modified air or gases might be conveyed in pipes like other "gases, and might be burned at its issue from properly constructed "burners."

When the said gas is applied for lighting railway carriages, "we supply the required current of air by means of the motion "of the axles of the carriage, thus making it self acting, the air so "obtained being used to produce the gas or vapours required for "the luminous and aeriform composition claimed in our first "Patent."

One of the present improvements consists in an improved mode of obtaining a current of air for the said gas for stationary purposes, or on board of a ship. "We generate the gas" in the manner described, "and employ a machine consisting of a barrel "or roller, upon which a rope, chain, or band is wound, as in a "clock, a weight at the other end of the rope giving the requisite "power, or a spring may be used inside the barrel." This machine works the bellows which supply the air.

Other improvements consist in an improved hydraulic and an improved fan for supplying air to the said gas; also in an improved reflector, moveable cap, and wind vane for carriage and other lamps where the said gas is used; and further, in improvements for obtaining heat and ventilation from the said gas, applicable to the warming and ventilation of any place, but more especially for railway carriages and ships. "To accomplish this object we employ a generator for gas and an air machine," "and "cause a current of air to pass through a metallic box heated by "ignited gas from a number of gas burners to any temperature "that may be desired, after which the heated air when used on "railways is delivered by pipes opening into the compartment "of the carriage requiring to be warmed and ventilated. The "delivery of the warm air may be at the bottom of the carriage "under a grating, or slit and so distributed to the feet of the "passengers. And in order that the air so warmed may be "healthful and beneficial, we pass it after it has been heated "through a pipe or box containing coke, pumicestone, pieces of "cloth, flannel, sponges, or other suitable spongy and porous "matters kept continually moistened by a slow dropping of "water." "This application of moisture will prevent the objec-"tionable burning or dessication of the heated air, which would "otherwise be detrimental to the lungs of the passengers, and "which so often produces headaches and great thirst where that "precaution is neglected."

And, lastly, in certain improvements in cooking operations.

[Printed, 1s. Drawing.]

A.D. 1862, November 10.—N° 3025.

CONNELL, CHARLES.—(*Provisional protection only.*)—" Improvements in constructing ships or vessels." This invention relates more particularly to the class of ships or vessels constructed with iron or steel frames and external wood planking, and is designed to admit of such planking being fastened by means of copper, yellow metal, or composition bolts or fastenings, in such a way as not to be liable, or so liable as hitherto, to the corrosive action which has been experienced, where copper, yellow metal, or composition bolts or fastenings have been used along with iron frames. It is where the bottom planking of the ship is fastened to the "floors" or floor frames that liability to corrosion has been principally experienced, on account of the presence internally at that part of the bilge water; but by the present invention such liability is avoided, or considerably reduced, by fixing or fastening the copper, yellow metal, or composition bolts or fastenings of the planking into beams or "floors" of wood, such wooden "floors" being themselves fixed or fastened to the iron or steel "floors" by iron or steel bolts or fastenings. If desired, this system of fastening may be extended more or less above the "floors," and it may be applied to other constructive details of the same or other classes of ships or vessels.

[Printed, 4*d*. No Drawings.]

A.D. 1862, November 11.—N° 3039.

BURRIDGE, HENRY. — "Improvements in apparatus for "extinguishing fires, applicable also for ventilating and fumigating, and for supplying, delivering, and distributing fluids." "The apparatus consists in the employment of a service pipe or "pipes connected to and communicating with one or more perforated pipes or tubes, arranged in the form of a framework or "otherwise, and extending under the ceiling the whole length "and breadth of such ceiling and across it. I recommend that "the perforations of the pipes be formed in their upper and "lateral sides. The said service pipe is also connected to and "communicates with a hose attached, as desired, to a supply of "water.

"In applying my apparatus to houses and other land structures, "the *service pipe*, combined with taps, plugs, or other like con-

"trolling agents, is conducted up the inside or outside walls (or "both), or between the walls and through them into the rooms "or interior of the structure (or through the decks in ships or "other vessels), and connected to the perforated pipes or tubes, "which being in the interior of the rooms at or near the ceiling, "water, steam, or other agent may, in case of fire, be at once "projected from the piping on the flames in the interior. The "perforated piping or framework of a number of rooms may "communicate with a single service pipe. The apparatus may be "applied for ventilating and fumigating, and for supplying, "delivering, or distributing fluids.

"Perforated pipes, troughs, gratings, or plates are fitted to the "floors of the buildings for the escape of the waste fluid to the "outside. When I use steam as the fire-extinguishing agent, I "sometimes use gratings or perforated plates," "fitted in the "floor or other part of the room, and a steam pipe carried under-"neath such grating or plate to admit steam into the room."

[Printed, 8*d*. Drawing.]

A.D. 1862, November 13.—N° 3065.

KOPISCH, Carl Gottlieb.—"Improved apparatus for pro-"pelling, steering, and ventilating vessels." This invention relates to a novel arrangement of apparatus whereby the propulsion of steam ships or vessels may be economically effected through the injection into the water on which such vessels float of columns or streams of heated air.

"The apparatus may be described as a furnace contained "within and extending from end to end of an elongated hori-"zontal steam boiler, below which is situated an air reservoir. "This reservoir is supplied with air by a pumping or blowing "engine of any ordinary or suitable construction, which air I pro-"pose to draw from the hold of the ship, bringing the various "cabins into communication by air pipes for the purpose of "effecting their ventilation. This pumping engine is to be "worked by a steam engine supplied with steam from the steam "boiler. The air reservoir is brought into connection with the "ash-pit of the furnace by pipes which supply air under pressure "to the fire-place. The furnace is connected at its rear end with "a chimney by two openings of different diameters, both of "which are capable of being easily closed. From the furnace

" also lead off air trunks, the outer ends of which open into and " below the surface of the water. These trunks serve to conduct " columns of air rearwards and direct them into the water, and it " is by the pressure of these columns of air upon the water that " the ship is propelled in any desired direction."

[Printed, 8d. Drawing.]

A.D. 1862, November 18.—N° 3099. (* *)

BROWN, Robert.—" Improvements in warming and ventilat- " ing, more especially applicable to buildings, carriages, and ships." The ventilation is effected by the heat of a gas burner or other light. " The light is supported by the vitiated air of the room or " other confined space. Supposing that I desire to ventilate an " apartment, a tube from the upper part of the room conducts " the vitiated atmosphere down to the light, which may be placed " at any part of the chamber. The impurities of the atmosphere " are thus consumed on passing through the flame, the products " of combustion being carried off into the open air by a confined " tube issuing above the flame and traversing the building in " any direction to some outer wall. By employing a second tube " within the mouth of the exit tube at the point where it meets " the outside air, and allowing this second tube to open into the " apartment I can supply warm fresh air to the room, the cold " air within the second tube being surrounded by the heated air " passing out is thereby heated, and issues into the room warm " and fresh."

[Printed, 10d. Drawing.]

A.D. 1862, November 19.—N° 3105.

CHALMERS, James.—" Improvements in the use, combination, " and application of iron and timber as armour for vessels of war " and fortifications." " In order to obtain a more effectual resis- " tance to the penetrating and destructive power of projectiles " " in the skin or side of the ship " " to be protected by armour, I " first apply what in my Provisional Specification of this inven- " tion I term 'a cushion of timber planking or other elastic or " 'yielding substance,' in order to lessen the rigidity of the struc- " ture, and to prevent the injurious effects of vibration caused " by the " impact " of projectiles on the armour plates from

"destroying the frame" of the ship, and the fastenings of the ship and of the armour plates. Outside of and covering the said cushion, "I attach an outer plate or skin, which may be more "properly termed an intermediate or second armour plate, which, "when secured to the side of the ship," "will form a surface on "which the compound backing herein-after described shall bear. "This compound backing shall consist of alternate layers of "timber planking and iron or steel ribs or plates, which shall be "built up outside of the said second armour plate, one of the "edges of the said layers bearing against the plate, whilst the "other edge is presented as a support or backing for the outer "or principal armour plate. I propose that the said layers be "bolted together laterally, and in order to secure a united body "and to facilitate the construction of this compound backing, "especially when following the curved lines of a ship, I propose "in binding the said layers together, to use bolts in short lengths "with coupling nuts, which nuts shall be of sufficient depth not "only to screw up the bolts which unite two or more layers "together, but also to receive the ends of other bolts or lengths "of bolts, which in turn, after passing through two or more "layers, shall in like manner be screwed up, and so on, until the "desired surface be covered."

The ribs of iron may be plain plates of the size required, or they may be formed with a small head and foot, or of such other section as would tend to bind the layers together, so that when force were applied to their edges they would act as a united body in resisting it. The planks in either case would be made to fit the ribs. "I further propose that the aforesaid layers be put together "with an adhesive substance between them, though they may "also be used without such substance; but I would prefer and "recommend the use of india-rubber glue or marine glue, or "such other substance as will make the two surfaces cohere, and "at the same time serve to neutralize or prevent such deteriora- "tion as might otherwise result from the contact of timber and "iron; and for the same reasons I recommend the use of the "said india-rubber glue or other suitable substance between all "surfaces when iron and wood come in contact when practi- "cable. With regard to uniting the alternate layers of planks "and plates aforesaid which form the compound backing, the "said glue or other substance may sometimes unite them

" sufficiently without bolts, in which case the lateral bolts afore-
" said may be dispensed with, and the necessity for holes in the
" plates and planks avoided. The aforesaid compound backing,
" as it is built up, can be attached to the ship" " by bolts in the
" ordinary manner, and the outer surface thereof formed by the
" edges of the planks and plates will form the bed or backing for
" the outer or principal armour plates."

In securing the armour plates to the ship, it is proposed to use through bolts with nuts and screws, either with or without a jam nut, and with a shallow thread of the form generally termed a " square thread," the depth thereof being only about half of the breadth.

"A second method of attaching armour plates to ships or forts
" which I propose is by fastening bars, such as I have described
" in the Provisional Specification of my Invention for Improve-
" ments in Armour plating Ships of War and Fortifications,
" N° 2897, (1862), " and as the said Provisional Specification
" was allowed to lapse, but was not published until after the date
" of the Specification of this Invention, I here introduce the
" description of the said fastening bars. In cases where through
" bolt fastenings would be injurious, as in the case of narrow
" armour plates, or otherwise, the armour plate shall be fastened
" to or through the backing by fastening bars of two inches in
" thickness, more or less, which bars shall be placed between the
" edges of the armour plates," " the outer corners of the edges
" of which shall be chamfered, and the outer edges of the fasten-
" ing bars shall be provided with a T or longitudinal head,
" corresponding with the chamfers in the edges of the armour
" plates, the said fastening bars to be 10 inches in depth, more
" or less. In order to secure the said bar to the ship," " bolts
" with heads shall be let into a notch in the inner edge of the
" said bar," "which notch shall correspond with the width of the
" T-head of the bolt. The end of the T-head bolt shall be
" secured with a nut, as in the case of the through bolts afore-
" mentioned. The notch in the bar shall be one inch, more or
" less, deeper in the lengthway of the bolt than the size of the
" bolt head, so that there shall be a space between the head of
" the bolt and the metal of the fastening bar, in order that when
" a projectile strikes the bar opposite a bolt it may not commu-
" nicate the jar to the bolt."

[Printed, 10d. Drawing.]

A.D. 1862, November 21.—N° 3135.

SANDERSON, George Grant.—(*Provisional protection only.*) —"Improvements in armour for fortifications and floating and "other batteries."

For the purpose of effecting these improvements, "I employ "bars of triangular section formed by rolling in a manner similar "to that in which railway and other bar iron is commonly made. "The base of the triangular section is made flat, and its sides are "made the one with a projection and the other with a correspond- "ing recess. The apex of the triangle is by preference truncated; "and the projection and recess at the sides are conveniently made "to occupy respectively about one half of the length of the side. "These rolled bars are to produce the armour placed side by side "on a suitable backing or frame, the bars being arranged alter- "nately, so that if the base of one bar is inwards towards the "backing or frame, the bars next it on either side are placed with "the bases outwards to form the face of the armour. When the "bars are thus arranged, the projection on the one will enter the "recess in the other, and so throughout the series, and the bars "form an armour with a flush surface both on the face and at the "back. The bars are secured to the backing or frame by bolts "at intervals passing through the armour and the backing or "frame."

[Printed, 4*d*. No Drawings.]

A.D. 1862, December 1.—N° 3224.

NEWTON, Alfred Vincent.—(*A communication from William Montgomery Storm.*)—"Improvements in the construction of "steam and other vessels." This invention relates to the construction of vessels of war and other ships, by covering the framing with a material that will form perfectly water-tight joints, present great resistance to, and will not splinter by the concussion of shot or shell, and will withal be materially lighter than plate iron.

The following is the mode of preparing this plating or covering material:—Take the commonest paper pulp, such as that of the cheapest straw board, mix it with a thin solution of marine glue, which is insoluble in water, and unchangeable by time or temperature, or with any other gum or resin suitable for insuring the firm

adhesion of the pulp fibres, and compress the compound in moulds to form sheets or slabs, say ten feet square and one foot thick, until it attains the hardness of oak, or even a greater degree of hardness. Before the sheets or slabs are dry and set, they are to be twisted to the forms required to suit the various parts of the hull. Thus provided with suitably shaped slabs, the shell, skin, or covering of the ship may be rapidly built up, two or more thicknesses of the sheets or slabs being used, the one to overlap the other, and break joints in all ways. These layers of covering material are to be both bolted and glued together, to make a firm compact mass. To facilitate the bolting together of the sheets, and the securing of the same where necessary to the ship's framing, it may be desirable to mould the sheets with bolt holes, thus saving the trouble of boring or punching out the holes.

Ships thus constructed will never "sweat," an important advantage as respects the health of a crew, and as great buoyancy will result from this construction of hull, the material used being lighter than water, these improved ships will form life-boats on a huge scale.

[Printed, 4*d*. No Drawings.]

A.D. 1862, December 2.—N° 3231.

WHEATLEY, John.—"Improvements in the construction of "ships of war, and in the manufacture of armour plates for ships, "forts, and batteries." "In constructing a ship of war according "to my invention, I form the bow with a sharp projecting grab "or crab bow at an angle of about 25° with the keel, and propel "the vessel by paddle wheels and screw, or by screws, the wheels "when used working independently, so as to steer the vessel "thereby. The rudder is to be supported by chocks, acting like "a common vice. In order to be able to mount guns of large "calibre and power," "in or near the centre of the vessel, pointing in a line with the keel, I construct a glacis plated over "with armour plates, and over the whole fore part of the vessel "and extending to the front of the paddle boxes."

"The guns are placed a little forward of the centre of the "vessel, where a casemated battery is formed, rendered shot proof "by armour plates." "They are mounted on slides, so as to fire "through embrasures," "are placed parallel the one to the other, "and have *no power of training*" but are laid on to the mark by

the steerage of the ship. The form given to the fore part of the ship will cause it, on running into another vessel, to rise on striking the blow, and then the weight of the ship tends to force under the adverse vessel, and will do so if the blow be struck with sufficient power. The armour-plated glacis will deflect off any shots which may strike it, and will in most cases throw them up clear of the battery. "I employ two screw chocks, one on each side of the "rudder; these being screwed will nip or hold the rudder in a "central position, or will support it in any desired position, the "chocks being more or less screwed up as may be required."

Another part of the invention consists in a mode of manufacturing armour plates, for which purpose the armour plates are to be rolled or formed with external parallel projecting ribs or lattice work at a distance apart less than the diameter of a shot or projectile, which would be thrown against a ship, fort, or battery protected or coated with armour plates, with the knowledge that the same would pass through the plating if of the ordinary construction. It is believed that balls or other projectiles less than four inches diameter, cannot be used with effect against armour plates such as are now employed, and therefore if the parallel projecting ribs or lattice work have a minimum space between them of less than four inches, when using a like quantity of iron in each square foot of the plating, no shot or other projectile which would be used could enter between two neighbouring ribs or lattices, so as to strike the surface of the plate on which the projecting ribs or lattices are formed without first injuring one or both of two neighbouring ribs.

[Printed, 8*d*. Drawing.]

A.D. 1862, December 2.—N° 3235.

GRAHAM, Dugald.—(*Provisional protection only.*)—"Improve"ments in steering and manœuvring ships or vessels or in the "apparatus employed therein." The improvements in the arrangement and construction of the steering apparatus of vessels consist, first, in forming an opening in the stem or "dead wood" at the forward part of the vessel, and fitting in it a rectangular or other suitably shaped rudder; or instead of being fitted in an opening in the ordinary stem, the rudder may be set to project forward beyond this stem. This rudder or steering apparatus is fitted on a vertical shaft, which passes down through the central

part of the rudder, and is stepped in a footstep bearing, arranged for the purpose in the framing of the opening, and which extends in a line with the lower part of the keel. As this mode of fitting the forward rudder admits of its being placed at right angles to the keel, it forms a very efficient means of quickly checking the progress of the vessel, thus giving the commander greater confidence in the control which he has of the vessel. These improvements also comprehend some arrangements of the ordinary rudder, so as to facilitate the working of it, more particularly in large ships. For this purpose the rudder is formed with an opening in it in which is hung a secondary rudder corresponding to the shape of the opening; suitable means are provided for working the secondary rudder either independently, or in conjunction with the main rudder. In this way when the main rudder is placed in an angular position, by the steering wheel, the smaller rudder turns upon its hinges like a door, and thus greatly relieves the pressure of the water upon the larger one. The inner rudder is then moved over to the same plane as the larger one by means of a secondary wheel or other equivalent actuating contrivance. In lieu of this arrangement the rudder may be divided into two parts, which are so arranged that either part may be put in motion either separately or conjointly; the object of the arrangement being in both modifications to lessen the difficulty of steering large ships by causing a portion of the rudder to be actuated in the first instance, and this to be followed if necessary by the motion of the second part. The difficulty of moving these duplex or compound rudders being much less than with those of the ordinary kind, the ship will answer her helm quicker than by the present system.

[Printed, 4*d*. No Drawings.]

A.D. 1862, December 4.—N° 3256.

ROBINSON, JOHN—" Improvements in the construction of " ships and vessels." " I make the floor timbers of my ships and " vessels entirely flat," " or a little raised, at the option of the " builder; first futtock or top timber" " all in one, to be abutted " against and dowelled to the end" of the floor timber; these futtocks or top timbers go up to the gunwale or rail for about one-fourth of the entire length of the ship from amidships. From this point " I *begin to cant* the timbers" " in the after body aft,

"and in the fore body forward, say about seven feet with the first
"timber, and keep the remainder as nearly parallel thereto as may
"suit the shape of the vessel."

In order to strengthen the bilge, a large log is fitted in the corner on the floors, and against the first futtock or top timber, and dowelled to the said floors and top timbers, and carried all fore and aft. Clamps are fitted on the top of the above-mentioned log, and are dowelled to the log and top timber, another clamp being fitted on the floors inside the bilge log, dowelled to the floor and bilge log, and thoroughly fastened in and out, and up and down, through the thick bilges. The bilges of the ship outside are planked with thick stuff to within about 5 feet from the keel. The rest of the bottom, between the thick outside bilges, to be planked with thinner stuff. This creates a channelled bottom, which the water flows through when the ship is sailing, one channel being on each side of the keel. This not only makes the vessel sail faster, but makes her exceedingly weatherly. In vessels with main-deck beams only, "I would have three clamps of suffi-
"cient size turned all round fore and aft under the hold beams,
"about twelve inches wide each or thereabouts, the remainder of
"the ceiling on the side of the vessel to be diagonal, at about
"forty-five degrees, abutting under these clamps and coming
"down to the clamps on the top of the log inside the bilge; but
"in vessels with two or more tiers of beams there must be clamps
"of sufficient size turned on the diagonal ceiling to receive the
"beams below the main deck. For the outside planking of the
"sides I use three or four strakes" "to be turned all round fore
"and aft for the top sides to answer as an abutment for the out-
"side planking, which is to be diagonal" "the reverse way from
"the ceiling or inside planking, and coming from the top sides
"down the bilges, and fastening to the outside of the bilge
"planking." Knees are to be fitted in the bilges, over the inside bilges and clamps, and well bolted through all. Double beams to be used at fore and after hatchways, and trussed with wrought-iron rods passing through the timbers, and screwed up outside them.

[Printed, 8*d*. Drawing.]

A.D. 1862, December 6.—N° 3281.

PALLISER, William.—"Improvements in screw bolts." This invention consists of certain improvements in screw bolts, the object of which is that the extension due to any strain may be

continued along the shank, instead of its being as heretofore confined to the screwed part. A peculiarity exists in iron or metal bars subjected to tensile strain, such that the extension due to the strain occurs entirely at the weakest point in the bar; thus in screw bolts, as at present constructed, the whole extension takes place in the last thread of the screw, which thus bears the entire strain.

" The measure of the strength of the bolt to resist an impulsive " strain is the product of the mean resistance it offers while " stretching into the distance through which it can stretch; if, " therefore, this stretch be virtually confined to the last turn of " the screw thread, and if this screw thread be one-tenth of an " inch wide, and further, if the bolt be required to stretch through " one-tenth of an inch, it will follow that the iron at this place " would have to stretch through a space equal to its original " length. This, the property of the metal will not admit, and " therefore rupture occurs. If, however, the bolt be reduced " at any part, for any short distance, say one inch, to the size to " which it is reduced by the screw thread; the iron at this place " will only have to stretch through one-tenth of its original " length, and since it can stretch this amount, the bolt will not " break."

" I propose in the first place to reduce the shank of the bolt " cylindrically, either in part or throughout its entire length, to " the size to which the end is reduced by the screw thread. " Instead of this, if it be desirable to do so, I can reduce the bolt " in part either about the middle or towards either end. And " supposing it to be required that the bolt should thoroughly fill " the bolt-hole, I can cast zinc, or other metal or alloy, round the " reduced part, and thereby make the bolt of uniform size " throughout.

" In order to diminish as much as possible the amount by which " it is necessary that the shank of the bolt should be reduced, I " propose making the screw thread much shallower and finer " than those in general use. I also prefer that this thread should " be of a rounded form, to obviate any tendency there might be " in a sharp thread to cause the nut to tear off the end of the " bolt. Instead of reducing the shank of the bolt, I can satisfy " the conditions above enumerated by forming the screwed part " of the bolt of shear steel, or other weldable steel, which I can " weld on to the *iron bolt*, in the form of the splice of a fishing " *rod.*"

"In the second place I form the head of the bolt by rolling "or otherwise drawing down the bolt from a bar of iron suffi- "ciently thick to leave the head on the bolt, by means of which "the grain of the iron will run in a longitudinal direction," and not partially transversely, as it does when the head is formed by upsetting or enlarging the iron. This part of the bolt will be thereby made better able to resist sudden strains.

"I do not limit myself to this form of bolt as applied to iron "only, but I claim it for all bolts which are subjected to impulsive "strains, whether made of steel, copper, or other substance."

[Printed, 8*d*. Drawing.]

A.D. 1862, December 8.—N° 3291.

HILLIAR, JOHN.—"Improvements in ventilating, and in the "exclusion of dust or draught, insects, or other animals, from "apartments, carriages, or other confined spaces."

The ventilator consists of one or more sheets of wire or other gauze of mesh and strength suitable, and the employment of several sheets of wire gauze is applicable also to other descriptions of ventilators for the purpose of excluding draught. "I attach "one, two, or more sheets upon one roller, or for the nicer grada- "tion of ventilation, I use two or more rollers with one or more "sheets of gauze, and by passing the beaded side edges into the "grooves or tubes," "I can at pleasure use any sheet singly, or "part of a sheet, or all or part of the whole number of sheets "combined." By using this invention the inventor considers that he can carry off heated and vitiated air from carriages, apartments, churches, or other confined spaces, at the same time admitting an imperceptible current of cold air from without, and preventing the admission of dust, smuts, or any perceptible draught.

[Printed, 10*d*. Drawing.]

A.D. 1862, December 12.—N° 3327.

WINIWARTER, GEORGE.—(*Provisional protection only.*)— "Improvements in the construction of portable houses, walls, or "partitions of buildings, strong rooms, safes, refrigerators, reser- "voirs, piers, and other structures, also applicable to the con- "struction of casks and similar articles, boats, and ships." The invention consists in constructing walls or surfaces of any description, or to be employed for any purpose, by placing metal

tubes bound round with straw or other similar material and steeped in clay, mortar, or cement, one on top or by the side of the other, between grooved posts, girders, or other supports, in the grooves of which the ends of the tubes are confined, forming thus a strong air-tight surface, which is a bad conductor of heat, and which has the advantage over ordinary wood, stone, or brick walls of being considerably stronger than these whilst it has a much less bulk or thickness. In some structures the tubes may be placed close together, on top or by the side of each other, without any covering, and the interstices may or may not be rendered air or water-tight by means of any suitable packing or cement, or the tubes may be surrounded with straw or other suitable material, and after they are in place they may be plastered in the ordinary manner. This principle of construction may also be applied to hollow vessels of any description such as tanks, casks, boats, or even ships, the ribs of the same being grooved to receive the ends of the tubes, which will be bent to the required curvature, and tied down or secured by means of suitable straps or bolts. The tubes may be of any desired sectional form, and in some cases, instead of employing tubes, trough-shaped lengths of metal are used.

[Printed, 4*d*. No Drawings.]

A.D. 1862, December 12.—N° 3333.

CLARK, George.—(*Provisional protection only.*)—" Improve-" ments in fortifications for the defence of ships, batteries, and " forts." The improvements consist, firstly, in a system of defensive armour composed of a combination of plates or sheets of iron or other metal, with plates or sheets of tough material of less specific gravity than iron, alternating with each other, and closely compressed and fastened together side by side, forming a compact body calculated to resist the penetrating force of projectiles, by opposing to it either the edges or flat surfaces of a mass of combined plates. " The plates of metal should be of such a " degree of thickness as to possess a ready elasticity, for which " purpose I recommend that their thicknesses should not exceed " 1 inch, varying from that thickness to $\frac{1}{8}$th of an inch." " The " plates or sheets of tough material are to be of about the same " thickness as the metallic plates, but they may be thinner or " thicker, *according as* experience and circumstances may deter-

"mine which is best. The materials I intend to make use of for "these plates are vegetable fibre, such as hemp, flax, cotton, "wool, hair, jute, cocoa-nut fibre, or any other kind of textile "plant or woody fibre," "formed from fibrous pulp into sheets or "plates of the required thickness, or I make use of the manu-"factured articles known as cardboard, mill-board, scale-board, "or papier maché; I also intend to employ split cane, or india-"rubber in its natural state or in the form known as vulcanized "india-rubber, or vulcanite and gutta-percha, or leather, together "or separately, for the formation of the tough plates or sheets, "the essential condition being the toughness of the material. "Wood cut into thin planks," and properly treated, "may be "used in lieu of the before mentioned materials." "In prepar-"ing the materials for the tough plates I intend to saturate or "mingle them with substances which shall render them incom-"bustible and waterproof." "But wood in its natural state will "not answer the purpose so well, because, from its cellular structure, "it is defective in the required toughness and would be easily "crushed; therefore, when I use wood in planks for the above de-"scribed purpose, in order to give it toughness and preserve it "from decay, I intend to saturate it with metallic solution, and with "or without saturation, to steam and compress the wood in the "manner well understood. For convenience in this description "I call the plates interposed between the metal plates, tough "plates."

"With the iron and tough plates prepared as above described, "I form blocks of the proper or convenient size as armour plates "for covering ships or batteries, either by placing them against a "backing one by one in alternate layers of metal and tough "plates, and cementing or fastening them together side by side "as the work proceeds, or I from compound blocks of the two "kinds of plates." "For the purpose of fixing the two kinds of "plates to each other I intend to use marine glue or india-rubber "cement, or other strongly adhesive substance or preparation. "In order to fasten the blocks or plates which may be fixed "vertically or horizontally to a ship or battery, I intend to use "two methods, namely, either my compound dovetail fastening "described in Her Majesty's Letters Patent, N° 482, granted to "me and dated the 25th February, 1861, or the following method, "which forms part of this invention :—The foundation or bearing "*surface to these* blocks is to be either the skin of an iron ship

" or an iron plate fixed for the purpose to the side of the ship or " battery." " To the foundation plate, in a vertical or longi- " tudinal direction, according as the armour blocks are to be " fixed, I rivet or screw the flanges of external angle or T-iron " frames of the same depth as the depth or thickness of the " armour blocks, so that when these are in their places abutting " against the foundation plate, the edges or outer surfaces of " both shall be exactly level with each other. The external angle " or T-iron frames, may be made with flanges of such a width as " to meet each other and entirely cover the foundation plate, or " without a foundation plate to form a bearing surface to the " armour blocks. The external angle or T-iron frames referred to " are to be parallel and distant apart the exact width of the " armour blocks for each strake or series, which I intend shall be " in two or more masses to form the width. Their length may " be varied according to the requirements of the structure to be " armour-plated." " Between the masses of the blocks I inter- " pose flat wedge plates slightly tapered or dovetailed, of metal " only, or of layers of metal, and tough plates of precisely the " length and width of the plates composing the armour blocks. " These wedge plates are made with bolts welded or otherwise " secured to their inner edge, such bolts fitting into correspond- " ing holes in the foundation or backing plate, and passing " through to the inside of the structure to which the armour is " to be fixed. The wedge plates being driven home will consoli- " date the masses and plates of the armour, and compress them " tightly between two external angle or T-iron frames fixed in " the manner before described. The points of the bolts are then " screwed or rivetted, and the blocks are firmly held in their " places."

2. In " counteracting the tendency of a conical bolt head, " when struck by a projectile, to act as a wedge and split the " armour plate. I effect this object by means of a tubular sheath " with a conical bore placed under the bolt hole in the " armour plate, through which sheath the bolt passes and rests " upon the shoulder formed by the conical bore of the sheath, " diminishing from the outside, the bolt being tapered to fit into " the conical bore of the sheath. The result is, that if the head " of the bolt receives the blow, it (the bolt) is not immediately " driven into the armour plate, but is arrested or impeded by the " resistance of the tubular sheath." " As a further prevention of

" the splitting effect of the through bolt head, I propose to " countersink it an inch or more below the surface of the plate, " and leave the orifice of bolt hole open the depth of the counter- " sink."

3. In the use of iron knees for strengthening the frames or ribs. These knees are to be placed 12 to 24 inches apart, in a vertical sense, between the frames of a ship or battery, for the purpose of supporting the frames laterally and strengthening them against fracture or collapse, as well as to afford additional support to the armour and its backing between the frames. They may be of any suitable dimensions to fit between the frames, and will vary according to the distance the frames of the ship or battery and the knees themselves are apart from each other.

[Printed, 8d. Drawings.]

A.D. 1862, December 17.—N° 3381.

LEFFLER, CARL JOHAN LAURENTZ.—(*Provisional protection only.*)—" Improvements in constructing armour for ships and " fortifications." " For this purpose I employ bars of a width " sufficient to form the thickness of the armour, and I place them " the one on the other, so that the edges of the bars form the " face of the armour." " I do not " " connect the several bars " the one to the other throughout their whole length so as to pre- " vent their yielding when struck independently the one of the " other, for a rigid mass is more easily penetrated by a shot than " one that is able to yield to the blow; but I secure the bars at " their ends by causing them to enter grooves in metal ribs or " frames which are attached to the main frame of the ship or " structure; these ribs or frames are formed of metal bars rolled " in one piece to the required grooved form. I do not attach the " grooved ribs or frames to the main frame by through bolts, as " this would weaken the frames, but I form recesses in the " grooved ribs or frames to receive the heads of bolts, and these " bolts where a timber backing is employed passed through this " backing to the frame behind." " I make each bar " " of which " the armour is formed," " a compound bar, a bar of steel and a " bar of iron welded together, then the iron is sufficiently tenacious " to resist breakage, whilst the steel will protect the iron from " being cut through by the shot, or in place of this arrangement " alternate bars of iron and steel may be employed. The top bar

" of the series I form much stiffer and thicker than the others, so " that it may be able to keep the other bars in their places; thus " the top bar becomes, in fact, a narrow armour plate, and it may " be secured by through bolts in addition to the grooved ribs or " frames before mentioned. Where the bars employed are of con- " siderable length, and consequently their flexibility, if supported " only at the ends, excessive, I limit this to any required extent by " forming dovetailed grooves at intervals in the back of the armour " (or series of bars), and driving bars or keys of corresponding " form into these grooves.

" In constructing armour plates I form a pile of alternate plates " of iron and steel, laid the one on the other until a sufficient " thickness is obtained, and I weld these altogether, and such " armour plates may be secured in their places by means of " grooved ribs or frames retaining their ends; these grooved ribs " or frames are rolled to the shape required, which causes them " to be much stronger than they would be were they built up by " rivetting together several separate bars.

" Ribs or frames of grooved metal rolled in one piece may also " be employed for securing ordinary armour plates to the frame " of a ship or structure."

[Printed, 4*d*. No Drawings.]

A.D. 1862, December 20.—N° 3403.

HARVEY, Frederic William.—(*Provisional protection only.*) —" Improvements in fitting and connecting rudders to ships and " other floating vessels." " The object of this invention is to " afford greater facility for 'shipping' and 'unshipping' rudders " when a ship is either ashore or afloat under all circumstances, " and to prevent, as far as may be, the possibility of the rudder " being lost or injured by the ship getting ashore. The means by " which I propose to effect these improvements are as follows:— " Along the edge of the stern post of a ship I form a circular- " shaped groove or channel, with a slit or opening along same, " and the bottom thereof I form solid and circular." The said groove and channel are intended to receive the shaft of the rudder, which should be formed cylindrical and fit easily therein. " I also " form an opening through the deck of the ship, sufficiently large " to receive the rudder, which has simply to be lowered from the " deck through said opening, the shaft of the rudder being

"securely guided by and held in the grooved channel aforesaid. "To the top of the rudder post I connect a swivel cap, and the "well-known right and left handed screw steering tackle. To that "end of the screw of said tackle situate furthest aft I connect a "long pin vertically, said pin passing through a hole in a stand, "and fixed to the ship's deck, so that upon the rudder striking "upon any substance, the rudder will be lifted, and with it the "steering tackle and wheel, the long pin aforesaid serving as the "fulcrum for the said tackle to move upon. Upon the obstruc- "tion being removed, the rudder and tackle will descend to their "normal position by their own weight. I propose to adapt tiller "ropes to the shaft of the rudder in case of accident to the screw "steering tackle aforesaid, and to connect same to an arm fixed "on the rudder shaft, said arm serving also to indicate the true "position of the feather of the rudder during the steering of the "vessel. These improvements are especially adapted for iron "ships."

[Printed, 4*d*. No Drawings.]

A.D. 1862, December 29.—N° 3464.

SLEIGH, Adderley Willcocks.—(*Provisional protection only.*)—"An improved method of rendering or making ships and "vessels, and floating and shore batteries or ambulant or sta- "tionary defences impenetrable to shot and shell, and to other "missiles and projectiles, and war rams." The improved method consists in "the employment and use of elasticity and reaction "obtained by the mode of arranging, placing in a certain direc- "tion, and fixing the hereinafter mentioned materials in the fol- "lowing manner:"—"Elastic or reactionary metal plates, or "timber slabs, of any required thickness or extent," are made "by placing between each of those plates or slabs (of equal size, "but of much less thickness) a metal plate or timber slab, or "several slabs or plates, thickly and closely studded with tufts of "thin fine fibres of vegetable, or metallic, or animal production, "such as fine springing metal wires, or bristles, or whalebone, or "a fibre called drafts; those materials may be used singly or "combined." The tufts "are to be firmly inserted into perfora- "tions or holes standing perpendicular to the plane of the plates "or slabs." "The first or inner plate or slab, which lies next to "the side of the ship or battery, is to be of such a thickness

"ordinarily as will be equivalent to the strength of a metal plate "of about half an inch thick, and has around its edges a raised "flange on the outer side of about one inch high; the second "outermost plate is formed in two equal parts with a strong "hinge and bolt passing through it, and is constructed on the "principle of the 'toggle joint;' the width of this plate, parallel "to the hinge, is to be one-fourth longer than the No. 1 or inner "plate, so that when its edges are placed against the flange of "No. 1 plate, the hinge will be raised about four inches from the "outer face of No. 1 or inner plate, thus forming on it a broad "obtuse angle. Between the elevated flange of No. 1 plate and "the obtuse angle ends of the No. 2 or toggle-jointed plate there "is to be placed one or more layers of the elastic reactionary "packing, and between these plates there are to be several layers "of the before-mentioned elastic reactionary packing, and filling "up the whole angular space on the outer side of No. 2 or the "toggle-jointed plate there are to be several layers of the elastic "packing, and outside of this packing there is to be a metal "plate of any required thickness, but about two inches square on "even side than the No. 1 or inner plate. This No. 3 or outer "plate has a metal flange all round it of two inches thick, which "flange descends towards the inner or No. 1 plate, one-third of "the thickness of the elastic packing round, and to which it is "closely and smoothly fitted, so that when it [that is, No. 3 "plate] is pressed or struck on the outer surface it yields towards "the No. 1 or inner plate next the side of the ship or battery, "and when the pressure or blow is removed it returns imme-"diately, or expands to its former position by the elasticity and "reaction of the vertical fibres and the toggle-jointed plate." The "No. 1 or inner plate is firmly bolted and screwed to the side "of the ship or battery, and forms a base or frame plate for all "the outer plates and for the elastic packing, which latter is also "secured by the No. 3 or outer plate, and this No. 3 plate is "secured by strong bolts passing through the elastic packing, "the toggle-jointed plate, and the No. 1 plate into the side of the "ship or battery; the outer heads of those bolts are round and "countersunk into spherical hollows in the inner surface of the "outer or No. 3 plate, and the rounded heads of those bolts are "secured in their sockets by large metal flange pieces or collars, "having spherical hollows to correspond with those in the No. 3 "plate, therefore those bolts revolve every way in their sockets,

"and pass through all into the side of the ship or battery into "sockets; those bolts have inner screw collars which bear on "the inner part of the ship or battery, and thus screw up firmly "and securely the plates and packing to the ships' or batteries' "sides, so that when struck on the outer or No. 3 plate they are "pressed into their sockets, which are surrounded by a thin layer "of elastic packing, and are covered by a water-tight cylinder."

[Printed, 4*d*. No Drawings.]

1863.

A.D. 1863, January 2.—N° 18.

MUNTZ, WILLIAM HENRY.—"An improved method of attach"ing sheathing to iron or other vessels." It consists, firstly, "in attaching metallic sheathing to iron or other vessels by means "of waterproof glue or cement combined with the interposition "of sheets of vulcanized india-rubber between the ship's side "and the metal sheathing, or of such other impervious insu"lating material as will prevent any galvanic action taking "place.

"And secondly," in "attaching such sheathing to wooden ves"sels by means of the waterproof glue or cement only, without "the interposition of any other material."

[Printed, 4*d*. No Drawings.]

A.D. 1863, January 5.—N° 35

BLACKTIN, HENRY.—(*A communication from Charles Blacktin.*) —(*Provisional protection only.*)—"Improvements in means or "apparatus for saving or preserving money, papers, or other "valuable property at sea in case of shipwreck." This invention consists of a waterproof vessel constructed in the form of a boat, or any other convenient form and size, and of suitable materials, so as to be capable of floating and resisting the action of water and rocks or other bodies. One or two openings or hatchways are made in the top of the vessel, to which water-tight covers or lids are to be fixed by suitable means. Valuable property may then be enclosed in this vessel, and placed on ship-

board; it may, in case of shipwreck, be thrown overboard, when it will float ashore.

[Printed, 4*d*. No Drawings.]

A.D. 1863, January 22.—N° 204.

LUNGLEY, CHARLES.—(*Provisional protection only.*)—" Im-
" provements in means for facilitating the repairs of ships and
" other structures." The invention consists " in digging or
" forming pits in the ground, and placing therein caissons with
" trunks for access and for air; or I make the pits water tight
" with cement or other materials suitable for the purpose. I fit
" campshead of wood or other material to receive the fittings for
" making the parts water tight round the ships or other structures
" when they are brought over the pits."

[Printed, 4*d*. No Drawing.]

A.D. 1863, January 27.—N° 238.

GREEN, RICHARD AUGUSTUS WILLOUGHBY. — (*Provisional protection only.*)—" Improvements in light rowing boats, usually
" termed wager boats." " According to my invention I make
" light rowing or wager boats of a circular form from end to end,
" and tapering off from the middle to a sharp point at each end,
" being in fact like two long cones placed base to base. In build-
" ing this boat there are four stringers or principal timbers,
" which, with the exception of the upper one, are continued from
" end to end of the boat. These stringers or longitudinal pieces
" are united by circular frames or timbers of graduated diameter,
" according to their position in the boat, the largest being in the
" middle and diminishing towards the ends. For two of these
" circular ribs I substitute two solid discs, one being placed
" immediately forward of the sculler, and the other in the position
" to act as a stretcher or footboard, or a support for the same.
" Having so constructed the framing of the boat I then apply the
" outside covering, which I make of a thin surface of cedar. The
" bottom half of the boat I make in two pieces, extending from
" the middle to each end, and so as to enclose half the periphery
" of the boat; these pieces are butted and lapped or half checked
" on each other at the junctions. The upper part of the frame-
" work I cover in the same way, but prefer to extend the single-
" piece planking from the end to about one-third or one-

"fourth of the length, the sides or edges being united to or butt-"ing against the edges of the bottom pieces. The remaining "part of the covering I form of two or three pieces carried up to "the opening or box, as it is termed, left for the sculler in the "upper half. The planking or covering of cedar I steam or "subject to the action of hot water in order that it may bend "and readily take the form desired. The covering terminates at "each end in a sharp point made from a single piece of wood, the "point of which I finish and sharpen by a copper covering or "point. The opening in the upper part of the boat for the "sculler I form the entire width of the boat, if only of nine or "ten inches in diameter, and surround it by a suitable frame or "box, which affords the necessary strength to make up for the "absence of the planking, the opening being cut to a sharp point "forwards with a raised fence to throw off the water, which "raised fence constitutes part of the box, the opening being "square or of other suitable form towards the stern, and of the "necessary extent. The solid discs introduced as part of the "framework before mentioned, together with the covering or "planking, renders the boat from those points towards each end "water tight. I screw on the cedar planking or covering, so as "to be easily capable of removal for repairs. I use outriggers "for the support of the oars or sculls, as usual in wager boats, "but instead of the simple rowlock in which the oar or scull "rests, I enclose it at the upper part and mount in it an oscil-"lating rowlock, in which the oar rests, the points of oscillation "being above and below, and in a vertical line, or nearly so, with "the bearing against which the oar pulls."

The boat may be furnished with places for two or more sitters, and pulled by oars or sculls, and by two or more persons. "At "the stern point I apply a small copper pin projecting downwards "to render her steerage by the sculls more easy, and to prevent "her twisting about too much. Boats of this construction may "be made very strong and light, weighing some 30 or 40 pounds, "and are highly capable of speed."

[Printed, 4*d*. No Drawings.]

A.D. 1863, February 2.—N° 299.

CLARK, William. — "*Improvements in armour-plated and "other ships.*" "According to my invention I build war ships

" having the main body or continuous parts of the hull but little " above the load line, say, some three or four feet, or it may be " only to the load line ; so far the mould of the ship is much as " in ordinary; from this level I carry up the hull of the ship in " sections, say, in two sections or parts (for a ship 400 feet in " length) of about 100 feet each in length, the one part com- " mencing, say, some 30 or 40 feet from the stem, and the other " about 20 feet from the stern. These parts I build up to the height " necessary for a man-of-war, and sheath or coat them entirely " with armour plates; the fore part of these sections or parts I " prefer of a bluff bow shape, while the after parts may be of a " semicircular or other form. The part of the lower body unoc- " cupied by these raised sections or structures will be a kind of " deck, which I form and cover over with strong iron plates to " give the necessary strength to the hull and to resist the force of " exploded shells or the graze of shot, to which alone it would be " subject, being nearly or quite horizontal. In building these " vessels I carry a light upper deck, it may be over the entire " area of the ship, which deck is carried between the raised parts " of the hull on girders stretched from the one to the other, and " if necessary, supported by pillars from the exposed plated deck " below. I have mentioned the raised parts of the hull as being " two in number, but three or other number may be adopted. " In the arrangement before described I would also carry up a " small section immediately behind the stem, but which need " not be covered with armour plates; it would serve as a com- " munication to the forecastle and as a support for the fore part " of the upper deck, or the upper deck may terminate at the " armour protected part both fore and aft. Besides covering the " raised parts of the hull with armour plates I cover the main " body thereof from end to end with armour plates, say, to the " required depth of 5 feet below the water line and over the " whole of the lower part of the hull rising above the water, which " may be to the extent of two, three, four, or even five feet. I " have supposed it may be necessary that the main and full-length " part of the hull requires to be five feet above the load line " to give the ship the necessary buoyancy or liveliness, but " which may not be the case, as the raised parts of the hull " are intended to and will give great buoyancy if depressed in the " water by the pitching and rolling of the vessel, and may produce " all the *necessary buoyancy* even although the full length and

"low parts of the hull be only at a level with the water line; "it may even be advisable to sink that part of the hull below the "surface of the water by admitting water ballast or otherwise "before going into action. In the latter case the armour plating "might be dispensed with at the low parts of the hull, while, if "sunk by the admission of water ballast only to the level of the "water line, a depth of 5 feet of armour plating would be suffi-"cient. I believe a ship so built will possess all the sailing "qualities necessary, will roll and pitch much less by reason of "the exposure of a comparatively small area of side to the force "of the wind and waves, and will come round and otherwise steer "much easier than a ship built in the ordinary manner of similar "length and tonnage." "The high parts of the sides are alone "pierced for guns. I have supposed the sea to wash over the "lower deck, as above described, but these parts might be en-"closed with light materials to give the ship greater buoyancy "and the space utilised if desired, but to be abandoned in case "of fighting. The ship must, however, be complete as a ship, as "before described with or without such addition given to the "buoyancy. This ship may be rigged somewhat as in ordinary, "and propelled by screw and steam power as usual; water-pro-"pelling jets may be used in some cases with advantage. I also "construct other than war ships in a similar manner, that is to "say, with a main low part of hull, from which is continued "upwards at intervals sections of the hull, each terminating in "front of a bow-like form, and aft of a circular or stern-like form, "the whole being bridged and decked over from end to end. "Such vessels being for mercantile purposes are lightly con-"structed, and I prefer to make them of great length as compared "with their beam, say, ten or fifteen times, which will effect great "economy in the power when propelled by steam, which it may "be advisable to apply at both bow & stern. The main and low "part of the hull would be little above the level of the sea, while "the other part would rise sufficiently above to give the necessary "buoyancy, the sea washing freely over the low part of the hull, "as before mentioned." "In constructing mercantile vessels on "this principle I adopt the most approved lines for the bow or "part which cleaves the water and the run of the ship, and add "great length to the waist, whereby I am enabled greatly to "increase the carrying capacity, while little additional power is "required to propel the vessel at the same rate."

[Printed, 10d. Drawings.]

A.D. 1863, February 4.—N° 319.

RUSS, BARNABAS.—"Improvements in the construction of iron "ships or vessels, and of armour applicable thereto." "This "invention consists of a novel method of constructing iron ships "or vessels of war or otherwise, having reference to their hulls, "decks, bulkheads, bulwarks, port holes or doors, cupolas, tubular, "cylindrical, or other forms of batteries, wherever placed, keels, "stems, and stern posts, and of armour or shield plates, appli- "cable thereto, said invention being applicable to every kind of "vessel and floating battery of every kind, or battery that can be "comprehended in the term of 'vessel.'"

"The vessels may be constructed with vertical ribs alone, or "with longitudinal ribs with the addition of vertical ribs, and "such ribs may be constructed solely or together throughout all "or any part of the sides of the vessel, and at any distance apart, "according to the purpose for which the vessel is constructed.

"Where the vessel is constructed with longitudinal ribs in "addition to vertical ribs, the longitudinal ribs are placed "between the vertical ribs" "and the external plating of the "vessel;" "the vertical ribs may then have a middle plating "fastened to their external edges by means of angle iron and "rivets," "and the longitudinal ribs may" "be fastened to the "last-mentioned middle plating, and to the sides of the vessel "by angle iron and rivets." "The space between the external "plating of the vessel and the middle plating may be of any "convenient width, and the spaces between the longitudinal "ribs may be left empty, or may be filled in any way that may be "convenient. I prefer to fill with wood such as teak or oak, or "a lighter wood, or with cement, or concrete or ebonite, and "sometimes with a composition such as next described, called "Russ's compound."

This compound "consists of pitch, tar, rosin, asphalte, or clinker, "or tough stone in about equal proportions by weight, the whole "being well mixed and boiled together over a fire of sufficient "heat, and poured in the spaces liquid and hot," "'topping' "holes being left to fill up hollows that have formed in the "cooling."

When the spaces between the external and middle plating are filled with any solid substance, the vessel may be built with the longitudinal *ribs fastened to* the external plating of the vessel

" low parts of the hull be only at a level with the water line; " it may even be advisable to sink that part of the hull below the " surface of the water by admitting water ballast or otherwise " before going into action. In the latter case the armour plating " might be dispensed with at the low parts of the hull, while, if " sunk by the admission of water ballast only to the level of the " water line, a depth of 5 feet of armour plating would be suffi- " cient. I believe a ship so built will possess all the sailing " qualities necessary, will roll and pitch much less by reason of " the exposure of a comparatively small area of side to the force " of the wind and waves, and will come round and otherwise steer " much easier than a ship built in the ordinary manner of similar " length and tonnage." "The high parts of the sides are alone " pierced for guns. I have supposed the sea to wash over the " lower deck, as above described, but these parts might be en- " closed with light materials to give the ship greater buoyancy " and the space utilised if desired, but to be abandoned in case " of fighting. The ship must, however, be complete as a ship, as " before described with or without such addition given to the " buoyancy. This ship may be rigged somewhat as in ordinary, " and propelled by screw and steam power as usual; water-pro- " pelling jets may be used in some cases with advantage. I also " construct other than war ships in a similar manner, that is to " say, with a main low part of hull, from which is continued " upwards at intervals sections of the hull, each terminating in " front of a bow-like form, and aft of a circular or stern-like form, " the whole being bridged and decked over from end to end. " Such vessels being for mercantile purposes are lightly con- " structed, and I prefer to make them of great length as compared " with their beam, say, ten or fifteen times, which will effect great " economy in the power when propelled by steam, which it may " be advisable to apply at both bow & stern. The main and low " part of the hull would be little above the level of the sea, while " the other part would rise sufficiently above to give the necessary " buoyancy, the sea washing freely over the low part of the hull, " as before mentioned." " In constructing mercantile vessels on " this principle I adopt the most approved lines for the bow or " part which cleaves the water and the run of the ship, and add " great length to the waist, whereby I am enabled greatly to " increase the carrying capacity, while little additional power is " *required to* propel the vessel at the same rate."

[Printed, 10d. Drawings.]

A.D. 1863, February 4.—N° 319.

RUSS, BARNABAS.—" Improvements in the construction of iron " ships or vessels, and of armour applicable thereto." " This " invention consists of a novel method of constructing iron ships " or vessels of war or otherwise, having reference to their hulls, " decks, bulkheads, bulwarks, port holes or doors, cupolas, tubular, " cylindrical, or other forms of batteries, wherever placed, keels, " stems, and stern posts, and of armour or shield plates, appli- " cable thereto, said invention being applicable to every kind of " vessel and floating battery of every kind, or battery that can be " comprehended in the term of 'vessel.'"

" The vessels may be constructed with vertical ribs alone, or " with longitudinal ribs with the addition of vertical ribs, and " such ribs may be constructed solely or together throughout all " or any part of the sides of the vessel, and at any distance apart, " according to the purpose for which the vessel is constructed.

" Where the vessel is constructed with longitudinal ribs in " addition to vertical ribs, the longitudinal ribs are placed " between the vertical ribs" " and the external plating of the " vessel;" " the vertical ribs may then have a middle plating " fastened to their external edges by means of angle iron and " rivets," " and the longitudinal ribs may" " be fastened to the " last-mentioned middle plating, and to the sides of the vessel " by angle iron and rivets." " The space between the external " plating of the vessel and the middle plating may be of any " convenient width, and the spaces between the longitudinal " ribs may be left empty, or may be filled in any way that may be " convenient. I prefer to fill with wood such as teak or oak, or " a lighter wood, or with cement, or concrete or ebonite, and " sometimes with a composition such as next described, called " Russ's compound."

This compound " consists of pitch, tar, rosin, asphalte, or clinker, " or tough stone in about equal proportions by weight, the whole " being well mixed and boiled together over a fire of sufficient " heat, and poured in the spaces liquid and hot," " 'topping' " holes being left to fill up hollows that have formed in the " cooling."

When the spaces between the external and middle plating are filled with any solid substance, the vessel may be built with the longitudinal ribs fastened to the external plating of the vessel

" doors or flaps out and over the rebates, in order that they may " rise or fall. When the doors or flaps are closed, they will form " their own fastenings and will be flush with the sides."

[Printed, 4*d*. No Drawings.]

A.D. 1863, February 6.—N° 341.

ELLISSEN, ADOLF.—(*Provisional protection only.*)—" An im- " proved method of treating sheeting and plates of iron to be used " in ship building and marine constructions for protection against " marine animals and marine plants." " I treat iron sheeting or " plate with cyanide of potassium or potash, or other material of " equivalent effect, for the purpose of this invention, so rendering " the same useful for ship building purposes and marine con- " structions, by protection thereof against marine animals and " marine plants."

" The following is an illustrative instance of how I should pro- " ceed to carry this invention into effect :—I should take sheet " or plate iron, and having heated the same (the holes for fixing " thereof being previously punched), I should dip the same in a " solution of cyanide of potassium or other equivalent material, " which will be poisonous to marine animals and marine plants, " or prevent them from adhering to ships or marine constructions."

[Printed, 4*d*. No Drawings.]

A.D. 1863, February 7.—N° 348.

CLARK, WILLIAM.—(*A communication from Henri de Lapparent.*) —(*Provisional protection only.*)—" Improvements in the applica- " tion of gas for the preparation of woodwork generally and iron " ships, for their better preservation and reception of paint or " other protecting coating, and for disinfecting ships, hospitals, " and other places." " This invention relates to the application " of inflammable gas under pressure (described in a previous " patent granted to me, and dated February 7th, 1862, No. 328) " for preserving wood and carpenters' work generally, and more " especially for carbonizing the bottoms of vessels entire, and after " they are built and completed. A jet of gas in ignition, which " may be either lighting gas or gaseous oxide of carbon, is pro- " jected on to the surface of the hull, and in order to render its " action more efficacious, and char the surfaces with greater

" rapidity, I have stated in the Patent above referred to that the " gas should be condensed before issuing from the nozzle to a " certain pressure; I also, in order to quicken combustion, inject " heated air (by means of a blower) in combination with the gas. " Now this invention relates to new applications of said mode " of carbonization for searing or charring surfaces intended to " resist destructive influences; for example, iron ships require " coating with a protective paint, and on returning from a " voyage the old coating must be removed by scraping, and re- " placed by a fresh one. According to this invention I apply the " some process of carbonization by means of a jet of inflammable " gas, especially lighting gas, or that obtained from oxide of " carbon, applied under a certain pressure with an excess of " heated air, for the purpose of cleaning such iron structures, as " also for preserving exposed surfaces, as above-mentioned. The " jet of gas burns up and detaches the rust, and completely and " rapidly dries the sheet iron, and so permits of the immediate " application of a fresh coat of paint or other covering; the gas " jet carbonizes the old coating, and separates it from the iron, " which is left clean and dry. The improvement thus consists of " a general and uniform carbonization of the surfaces of iron " ships by means of an inflammable gas. I also apply this " improved process for the carbonization of the holds of ships, " whether of wood or iron, on returning from a voyage, and so " completely dry the hold and destroy any miasma of vegetable " or animal origin which might tend to rot the wood and produce " unhealthiness in the crew, and damage the materials, provisions, " or cargo stowed therein."

These improved processes may also be applied for the purpose of disinfection in hospitals, lazarettos, colleges, &c.

[Printed, 4*d*. No Drawings.]

A.D. 1863, February 11.—N° 377.

HUMPHRYS, Edward.—(*Provisional protection only.*)—" Im- " provements in apparatus for steering ships." " For this pur- " pose I employ hydraulic power, there being a cylinder and piston " connected with the tiller, and giving motion thereto, the " cylinder being supplied with water or liquid under pressure " from an accumulator or chamber, in which it is kept at a " constant pressure, and into which the liquid is pumped by the " engines of the ship; so far, however, the arrangement does not

"differ from what has before been practised. According to this "invention, however, on the bridge of the vessel or other place "from which it is desired to steer the ship, and at a distance "from the steering cylinder, I employ a slide valve contained in "a chamber, and this is connected with pipes which are led away "to each end of the distant cylinder; the valve chamber also "communicates with the accumulator. The valve is connected "to the steering lever, and is moved by it, so that when the steer-"ing lever is moved towards either side, it allows the water or "liquid to flow from the accumulator to the steering cylinder, "so as to produce a corresponding motion of the rudder. When "the valve allows the water or liquid to flow to the cylinder on "one side of the piston, it allows it to escape from the cylinder "on the other side of the piston, but when the steering handle "and valve are placed centrally, the liquid is locked in the "cylinder, and the rudder is held stationary wherever it may have "been placed. I lay the two pipes from the valve chamber to "the steering cylinder in a groove in one of the deck planks, and "I cover the groove with metal plate, so that the pipes may be "out of the way of injury, and yet readily accessible, and in the "same grooved plank I place a rod, which moves with the rudder "and actuates an indicator placed near the steersman."

[Printed, 4*d*. No Drawings.]

A.D. 1863, February 20.—N° 466.

BELL, Richard.—"Improvements in armour-plating or pro-"tecting ships and vessels." The invention consists in securing to the iron frames or ribs horizontal double surface plates, that is, plates somewhat similar in form to ordinary rails for railways, the web or beam connecting the two surfaces being of a depth varying with the requirements of the ship; the inner surface of the plates is recessed so as to receive between every two plates an intermediate and smaller but similarly shaped horizontal strengthening plate. Between every two plates, where they are brought together "on the outer surface, "I fit a rib or filling-up piece of teak or "other suitable material, and for the purpose of tightening all "the plates I make an aperture through the web of all of them, "and introduce in such aperture, in a heated state, a bolt or "bolts, so as to run vertically; I then pass a key through the "bottom of the bolt, which on cooling tightens all the plates, and

" gives stability to the whole structure. I bed the inner surface " of the plates on tarred felt, or other like suitable material. In " some cases I surround the vertical tie bolt with a wooden " washer or collar; at intervals I pass iron collars or clips, " which run at right angles, or nearly so, to the vertical tie bolts " round the vertical bolts, and key the clips to the inner side of " the frames or ribs of the vessel."

[Printed, 8*d*. Drawing.]

A.D. 1863, February 24.—N° 497.

SPINK, Daniel. — (*Provisional protection only.*)—" Improve-" ments in the construction and arrangement of armour plates " for ships." " In carrying this invention into effect plates or " bars of wrought-iron, steel, or other material adapted for the " purpose are placed with their edges outwards, such plates or " bars having projections formed thereon out of the plates or " bars themselves, so as to constitute an armour of great " strength. The plates or bars are connected tightly together by " means of large bolts passing through the sides thereof, such " bolts also serving by means of small eye bolts, through which " the former pass, to secure the armour to the hull of the ship."

[Printed, 4*d*. No Drawings.]

A.D. 1863, February 24.—N° 508.

WILLSON, Hugh Bowlsby.—(*Provisional protection only.*)— " Improvements in the construction of war and merchant ships." " The main object of this invention is so to construct war and " merchant vessels that although built of large capacity they shall " be able to navigate shallow waters and obtain high speed with " moderate power. To this end I form the hull of a vessel in " midship cross section of a figure approaching that of a " parallelogram, the lower immersed angles being rounded off to " mitigate resistance and the more readily to deflect wave undu-" lations, and for the same reason I also curve the bottom or " floor downwards from a few feet on each side of the keel, which " thus becomes enclosed inside the ship's skin from end to end. " The rest of the floor is made long and level to give buoyancy " and prevent the ship from pitching deeply into the seas. This " enables me to give a finer entrance and run, which I prefer to " be slightly hollowed to lessen resistance. The longitudinal as

" well as the general strength of the ship I secure by carrying a
" central wall, constructed in the same manner as the side walls,
" from the keel, to which it is fastened at all points, up to the
" main deck so far fore and aft as may be necessary to obtain
" adequate strength; and in cases where the necessary stiffness
" cannot be thus gained I spring an arch nearly from one end of
" the vessel to the other, so as to make it constitute a part of the
" structure of the central wall, which arch may be carried above the
" upper deck in merchant vessels to such height as may seem need-
" ful. This central wall also adds security to the ship by dividing
" it into two longitudinal and equal water-tight compartments.
" The transverse girders extend from either side of the vessel's
" framing to the central wall or great longitudinal girder, and are
" firmly secured thereto, by which means the central wall or
" girder remains unbroken and unimpaired in strength.

" In order to steer ships of war constructed in this manner,
" and more especially such as are intended to go either end fore-
" most and to be used as rams, I provide two rudders, which are
" placed in a line with the ship's keel between the ends of the
" great central girder and the vessel's ends, mounting them so
" that they may be raised into chambers in order that only one
" may be used at a time if desired, or into which they will be
" pressed upwards in case of coming in contact with the bottom.
" Rudders so placed under the ship's bottom have always a uni-
" form action on the water and are free from accidents in action,
" and by using both on such occasions great command over the
" ship is obtained. Each rudder is mounted on a pendent
" vertical spindle or stock which passes down from the wheel
" house, and is suspended by weights which nearly counter-
" balance it. This spindle turns freely in a bottom bearing that
" works in vertical guides in the chambers intended to receive the
" rudder. When, therefore, the rudder meets an obstruction,
" the bottom bearing, with the spindle and rudder, being nearly
" balanced by the weights, will be pushed upwards by a small
" degree of pressure. The weights are prevented from oscillation
" when the ship rolls or pitches by vertical guides.

" When building this improved construction of ship for war
" purposes, I propose to render them applicable for carrying one
" or more of the largest-sized mortars or guns by providing
" mortar beds of timber, which shall so distribute and neutralize
" the shock of the recoil as to protect the ship from injury.

" Across that part of the hull intended to carry the mortar or " heavy gun I throw transverse arched girders, which are firmly " secured to the walls of the vessel (in addition to the middle " deck girders) which pass through the spaces to be left between " the timbers; and within the spaces circumscribed by these " arches and the outer walls and floor I place layers of timber " arranged alternately transversely and longitudinally, leaving " spaces between the baulks of each layer equal to the dimensions " of the timbers. These timbers I bolt firmly together, and thus " make a massive framing or bed for receiving the mortar or gun, " which, when fired, can only affect the ship's structure through " the deadening influence of this elastic bed; such beds being " placed between water-tight compartments may be filled with " water to prevent ignition from hot shot should they find their " way into them. Where the central wall is used the mortar " beds must be made to conform to its position and duties."

[Printed, 4*d*. No Drawings.]

A.D. 1863, February 26.—N° 535.

EDMONDS, Henry. — " Improvements in the ventilation " of ships and vessels, and apparatus connected therewith." The improvements consist " in ventilation, by means of and " through a system of shafts and air channels invented by " me, designed to act upon those parts of a ship's interior " where ventilation is most necessary, and for which purpose " they are peculiarly adapted, acting as they do directly upon " them. Those parts are the upper spaces of inhabited decks " between the beams, cabins, storerooms, and magazines, the " bilges, and those channels between the inner and outer plank- " ing or plating of the ship, separated from each other laterally " by the upright timbers or ribs, extending from above down- " wards to the bilges. These channels are ordinarily called the " ' openings ' or ' timber spaces,' and it is highly desirable that " they should be ventilated for the preservation of the ship's " frame timbers from decay or ' dry rot,' as well as to prevent " their damp exhalations, together with the foul air from the " bilges, being vented, as is now usually the case in merchant " ships, through the ' list piece ' space along the ship's side " internally into the mess or cabin deck room, or as in ships of

"war, through open spaces above the shelf pieces between the "beams of the same deck, and close to where the sailors sleep in "hammocks at night, where the greatest care should be taken to "preserve the air from contamination. Through the first part of "my apparatus about to be described, the action of those "'openings' is reversed, and they are converted into most "efficient means for carrying off the foul air from the inhabited "decks as well as the bilges. To effect this, I connect them "together by constructing longitudinal shafts or enclosed air "passages along the ship's sides, externally or internally, over "the 'list piece' space internally I consider the most convenient "position, extending for any part or the whole of its length, "constructed of thin sheet metal, or of wood, or of both com-"bined, having communication by means of an aperture of "regulated size, proportioned to their number and the size of the "shaft, into each of the openings between the timbers: a circular "hole of about two inches in diameter I consider sufficient for "each in a large ship. These 'openings' channels thus become "so many branch air passages, from about 100 to 150 in number "on each side, acting by their upper extremities on the most "impure air of the mess and cabin deck, and by their lower "extremities on the foul air of the hold and bilges; all their "other outlets should be carefully closed, but the 'openings' "may be also communicated by means of apertures or connect-"ing tubes with any compartment requiring ventilation. These "longitudinal shafts may be used either independently of or in "connection with the second part of my invention, which I shall "next describe. For one or more planks, or any portion of them, "forming the ceiling of the deck to be ventilated on each side of "the ship, I substitute a hollow channel or air passage, extend-"ing for all or any part of its length ordinarily level with the "deck above, but which may be made slightly arched or project-"ing above." "The material I prefer to use in the construction "of these channels is iron or brass, or it may be wood only, or "strengthened with metal." "These deck air channels should "have perforations below, so as to communicate with every space "between the beams of inhabited decks and cabins where "impure air naturally collects; connected with each perforation, "may be a small transverse air channel, with smaller perforations, "so as to diffuse its action."

By this system, "composed of two series of air shafts or

"channels," "I effect communication with every part of a ship "requiring ventilation." "The first described I call the 'longitu-"'dinal' or 'openings' ventilating shaft, the second are the deck "air channels; I can either communicate these by means of one "or more cross shafts, uniting them in the centre of the ship or "wherever it may be convenient, and connecting these into one "or more vertical shafts of sufficient size and height, with "reversible cowls to complete the ventilation, or I can ventilate "them separately by communicating each into one or more of "such shafts, or in any convenient manner.

"In steam vessels I prefer to use the funnel draught for this "purpose by leading a cross shaft communicating with the "longitudinal shaft and deck channel of each side by a valved "opening into some part of the funnel, its uptake, or into the "ash-pit of the boiler furnaces; if into the funnel or uptake, I "so arrange the valve that in the act of closing the opening into "the funnel it leaves clear a passage up the funnel casing, which "being highly heated when the engines are at work will alone "create a powerful draught, but it will rarely be necessary even "when steam is up to shut-off the communication into the "funnel, up which the draught is then very powerful, and even "when the fires are not lighted it is considerable; to increase it "at night, I recommend a small fire or stove to be placed in one "of the furnaces or ash-pits on each side, when the fires are not "lighted for steaming purposes.

"In ships where the masts are of iron and hollow, I prefer to "avail myself of their constant up-draught by communicating "my deck air channels into them, also by means of a short air "tube opposite each mast. Fans, screws, or bellows worked by "hand or by steam may also be employed in connection with "any part of my apparatus."

"Although I prefer to ventilate by extraction of foul air, and "thus assisting natural ventilation, my shafts and channels are "equally available for the introduction of fresh air through them, "which they would diffuse uniformly where it is most wanted "without perceptible draught."

The Inventor does not claim any originality in the "ventilating "powers" of which he has availed himself, but only in using them in connection with the whole or any part of the system of air shafts and channels, invented by him, namely, "the first part "*of my apparatus,* which I have called the 'longitudinal' or

" 'openings' ventilating shaft, and the second part or deck air " channels of whatever materials these may be constructed, " whether used in steam or in sailing ships or vessels, separately " or combined, I claim them, and ventilation by means of them," " in whatever manner foul air may be extracted through them, or " fresh air introduced into them for ventilating purposes."

[Printed, 10*d*. Drawing.]

A.D. 1863, February 26.—N° 538.

LILLEY, GEORGE HENRY.—(*Provisional protection only.*)— " Improvements in apparatus for connecting and securing to- " gether planks of wood, applicable to the building and caulking " of ships and other vessels." The invention as applied to securing the planks of ships is as follows :—" I form along the top and " bottom edges of the planks lengthwise, holes or apertures, the " said holes or apertures in one plank corresponding with those " in the other, and into which I insert right and left handed " screws. The screws at or about their centre have nuts thereon " with apertures therein. The material for caulking is led from " one screw to the other between the planks, and by inserting " levers in the apertures in the nuts, the planks are drawn " together with the caulking between the nuts taking into recesses " formed in the planks for that purpose, and thus a perfectly " water-tight and flush joint is obtained. The material I prefer " for caulking is vulcanized india-rubber, but any other suitable " material may be used."

[Printed, 4*d*. No Drawings.]

A.D. 1863, February 28.—N° 570.

PAINE, EDWARD.—" Improved apparatus for facilitating the " cleaning of vessels' bottoms while afloat." " This invention " has for its object a simple apparatus to facilitate the cleaning of " the bottoms of navigable vessels when afloat in harbour or at " sea, and consists of an oval, compressed, egg-ended or other " suitably shaped hollow vessel formed of iron or other suitable " material, surrounded on the outside by a series of brooms or " brushes made from bristles, cocoa fibre, piassava, or other suit- " able material, cocoa, india-rubber, or other suitable matting, " alone or in combination with brushes or brooms. The sides " and ends I provide with suitable eyes or other means for con-

" necting guy ropes thereto, in such a way that the said eyes or
" their mechanical equivalent will not come into immediate con-
" tact with the ship's sides or bottom when in use, thereby
" preventing injury thereto. One of these guy ropes I connect
" to the front, and another I attach to the rear end, and one to
" each side of the hollow vessel. The end guy ropes I prefer to
" connect to the side ropes by bridle ropes.

" This my improved apparatus may be used as follows:—Carry
" one of the end guy ropes through a block attached to the
" under side of the bowsprit or jibboom end, then pass one of the
" side guy ropes under the vessel's bottom and through a block
" on the foreyard arm and on to the deck; after which carry the
" rear guy rope outside of the vessel, clear of the rigging, and
" through a block attached to the end of the mizenboom or other
" spar projecting over the vessel's stern, and lead it on to the
" deck. Then throw the hydraulic scrubber overboard, and haul
" and let go alternately on the guy rope passed under the vessel's
" bottom as often as may be found necessary; after which slack
" off the fore guy rope a little and slightly brace up the yard, and
" and repeat the operation all along one side of the vessel, remov-
" ing the guide blocks on the foreyard arms to the mainyard arm,
" and so on, after which the same operation is to be performed on
" the other side of the vessel. In some cases I prefer to mount
" the float on travelling wheels, to facilitate its action and keep
" the brushes from being pressed to heavily against the sides and
" bottom of the vessel. The guy ropes I prefer are those con-
" structed of coir or other material of a light specific gravity.

" Some objections having been raised as to the probability of
" the guy ropes fretting in passing under vessels having deep and
" sharp edged keels, I have designed several modifications of a
" creeper to travel along the keel, which creeper is provided with
" a 'live' or 'dead' sheave or pulley, as well as an antifriction
" chain or rope in lieu of the ordinary guy ropes."

[Printed, 8*d.* Drawing.]

A.D. 1863, February 28.—N° 571.

SYMONDS, Thomas Edward.—" Improvements in the con-
" struction of screw-propelled ships, and in the arrangement and
" mode of disconnecting, withdrawing, and lifting screw pro-
" pellers." "*This invention* relates to twin or double screw ships

" built of iron, and having one or more keels, each screw being " overhung or having no outer bearing.

" In constructing ships according to this invention, I form or " insert two transverse bulkheads across the stern part of the " ship, the aftermost of these bulkheads being immediately before " the screw, and I form a wellhole for receiving each screw under " the counter and abaft the transverse bulkhead.

"For the purpose of enabling overhung screws according to " this invention to be raised vertically, I mount or fix each screw " upon a short length of shaft, which is supported by and free to " revolve in a long bearing formed by two half carriages, which " when brought together form a tube, which may be filled with " lignum vitæ strips or other bearing and wearing surfaces. " These half frames when combined form the carriage, and which, " sliding in a vertical frame or guides between the transverse " bulkheads enables the screws to be raised vertically, so that the " ship may sail without the obstruction offered by the screw pro- " peller. Each screw may be raised separately. The inner end of " the short shaft, upon which the screw is mounted, may be fitted " with the ordinary form of cheese-head coupling. The with- " drawing the screw from the water or the raising and lowering " may be effected by means of chains or ropes and pulleys, or any " other of the well-known mechanical means may be adopted for " that purpose. The foremost of the transverse bulkheads is " fitted with a stuffing box for the screw shaft, and one part of " the cheese-head coupling projects therefrom. The apertures for " the screws are fitted with flaps or shutters opening outwards " (or they may be made to slide), for the purpose of closing the " opening at the bottom of the screw hole, so as to insure a clear " delivery of the water, whether under steam or sail. The over- " hanging end of the screw or one of the blades may have a hole " cast or formed therein for the purpose of enabling the screw to " be 'fished,' or to assist in withdrawing it or hauling it up.

" For the purpose of withdrawing the overhanging screw hori- " zontally from off the screw shaft in double screw vessels, I " form the after end of the screw shaft in the following manner:— " I make the shaft at the outer end sufficiently large to enable " it to be bored or otherwise made hollow, for the purpose of " receiving the shank of the screw, or a short length of shaft upon " which the screw has been fitted, and by means of a gib and " cotter passing through slots formed in both the screw shank or

" shaft and the hollow part of the main shaft within or forward
" of the stuffing box, or between the outer and inner bulkheads,
" or forward of the stern bearing, thus the key or other means of
" securing the overhanging screw in its place may be withdrawn
" and the screw released.

"By the arrangement of bulkheads forming the after termina-
" tion of the hull in the manner described, I am enabled to give
" additional strength to the ship as a structure, and by the
" arrangement and disposition of the stern part externally and of
" the rudders in double-keeled vessels I am enabled to avoid the
" necessity for any after stern post, upright, or framing piece
" abaft the screw propeller, or any opening or void, such as exists
" in ships of war and other vessels, between the fore and after
" stern posts, which impairs the steering qualities of the ship.

"In iron screw vessels having double keels I place a rudder in
" the line of each keel, and nearly in a line with each screw shaft,
" and I connect the tillers together so as to enable them to work
" simultaneously, but they may be readily disconnected for the
" purpose of being worked separately."

[Printed, 8*d*. Drawing.]

A.D. 1863, March 3.—N° 587.

SYMONDS, Thomas Edward.—" Improvements in the appa-
" ratus for steering ships." The improvements relate, first, to
" a novel mode of constructing and working rudders for steering
" ships and other vessels, by which additional surface and increase
" of rudder power can be given when required.

" And, second, to the mechanical means employed for trans-
" mitting the motion of a steering wheel and the power applied
" thereto to the rudder of a ship, by which jerking and undue
" straining are avoided, a simplification of the tackles and inter-
" mediate connections is effected, and the risk of wringing or
" twisting the rudder head prevented, and by which also fewer
" hands are enabled to steer a ship in the heaviest weather.

" I construct rudders somewhat of the usual shape and dimen-
" sions, or having about the same area, and by preference I make
" them of wrought-iron framework, and hollow or open, and by
" means of side plating screwed or rivetted upon each side of the
" *frame close the sides of* the rudder frame; or the plates may be

" made to slide vertically into V or other shaped grooves formed
" in the frame; or the rudder may have a frame and middle plate
" or web of iron, and the supplementary rudder be composed of
" two external plates joined together, and sliding in grooves and
" forming guides.

" The rudder post or shank is likewise made hollow on the side,
" or bored out to receive the spindle or shank of an interna
" sliding or supplementary rudder fitted within the hollow rudder,
" which conceals the supplementary rudder when the latter is out
" of use. The upper end of the central spindle or shank may
" either have a rack or ratchet on its face, or it may be screwed,
" for the purpose of being acted upon by means of a pinion or
" nut, so that the internal sliding or supplementary rudder, when
" additional surface is required for steering, is projected from the
" main rudder and held securely whilst in use, and when the
" necessity for its use has ceased it may be withdrawn. Instead
" of the screw or rack motion of the central spindle acting direct
" upon the internal sliding or supplementary rudder, so that it is
" projected or withdrawn at the same rate as the central spindle
" is moved up and down, a lever or levers may be introduced
" between the central spindle and the internal sliding or supple-
" mentary rudder, so that their ratios of motion or travel and
" also the direction may be varied."

In the form of rudder more specially suited for double or twin screw steamers having two keels, and constructed in accordance with the arrangement shown and described " in Letters Patent " granted to me on the Twenty-eighth day of February, One " thousand eight hundred and sixty-three," the motion is communicated to the sliding piece or auxiliary or supplementary rudder, by means of mitre wheels mounted upon a horizontal shaft, and taking into mitre wheels on the vertical screwed shafts fixed to or forming a part of the sliding piece or supplementary rudder, the horizontal shaft and its wheels being actuated by a mitre or bevil wheel fitted to the lower end of a vertical shaft, working within the hollow shank of the main rudder.

" For the purpose of communicating the manual power applied
" through the steering wheel to the rudder of a ship, instead of
" and as a substitute for any of the existing systems of screws
" *and lever arms,* pinions and racks, or other similar gearing, and

" instead of the ordinary barrel and chain or chains, fair leading " tackles, and such like contrivances, I substitute the following " apparatus :—Within suitable side framing I mount two barrels " or drums, each having several grooves or scores therein, accord- " ing to the number of turns of rope or chain required; the axis " of each barrel or drum being parallel to the other, the ridges or " flanges on the one barrel are opposite to the bottom of the " several grooves, scores, or furrows in the other barrel. Each " barrel having a spindle and a spur wheel keyed thereon, or " secured to the barrel, motion is communicated to them simul- " taneously by a pinion or pinions on the shaft of the steering " wheel, and the rope or chain which is to act upon the yoke or " tiller of the rudder is made to pass round both drums in the " several grooves or furrows formed therein, and is led off right " and left, or top or bottom, as the case may be, towards the " rudder yoke or tiller. The arrangement and disposition of the " barrels towards each other may, however, be horizontally on the " same plane, or vertically in the same line.

" For the purpose of holding, retaining, or securing in position " the steering wheel, and for the prevention of accidents, I em- " ploy a cone friction break worked by a lever or treadle, and " where two steering wheels are mounted upon the same shaft, " spindle, or axle, two friction breaks may be applied and con- " nected with the same lever or treadle, and the cone friction " breaks may be separated or withdrawn by a single lever.

" For the purpose of increasing the holding power when chains " are employed, the grooves in the barrels may have projecting " teeth, or small cogs, or transverse scores.

" By means of the apparatus described, the power necessary " for steering the vessel by moving the rudder over is more " steadily and better transmitted either direct or through one set " of tackles than by any other method at present in use, and the " great power and facility afforded by this apparatus renders un- " necessary the employment of steam or hydraulic apparatus for " working rudders.

" Instead of employing iron, the presence of which affects the " working of the compass, the whole of the framing and gearing " may be cast and made in hard gun metal, and white metal " bushes may be employed in the bearings."

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1863, March 3.—N° 589.

SAUNDERS, Robert.—(*Provisional protection only.*)—" Im-
" provements in metal sheathing for ships and vessels, and in the
" securing of such sheathing thereto." " The under side of the
" sheathing, or that intended to be next to the planking or skin
" of the ship or vessel, is to be made of uneven surface or ridged
" so as to provide at intervals thicker portions to admit of counter
" sinking the heads of the nails or screws necessary for securing
" the said metal or sheathing to the ship or vessel. And in order
" to the better securing of the sheathing, I would screw or nail
" on strips of metal fore and aftwise to receive the edges of the
" sheathing. Between the intervals aforesaid I can fill in thin
" cork or any other soft material. By these means I am enabled
" to produce a uniform outer surface, such as will be conducive to
" the speed of the ship, besides avoiding the necessity of using
" so many nails as are at present employed."

[Printed, 4d. No Drawings.]

A.D. 1863, March 4.—N° 602.

PALMER, Charles Mark, and McINTYRE, John.—" An
" improved mode of applying and fastening metal sheathing to
" the bottoms of iron ships or vessels, and to iron for other uses."
The invention consists in fixing to the iron plates of the ship or
vessel, or to iron for other similar uses, " strips of metal, which
" we prefer to be of galvanized iron, in which strips are inserted
" rivets of copper or other suitable soft metal, such rivets pro-
" truding from the strips in such a manner as to admit of
" sheets of copper, ' Muntz metal,' zinc, or other sheathing,
" previously punched, being applied thereto and held thereby as
" required. By this arrangement the strips fixed to the vessel
" form carriers for the sheathing, and obviate the necessity of
" perforating through the ship's side. The strips are double
" (that is to say) there is one outer and one inner strip, and they
" are applied to the plates of the vessel by means of screws or
" rivets passing through both strips and into the said plates, the
" copper rivets having been previously inserted in an opposite
" direction in the outer strip. The sheets of copper, ' Muntz
" metal,' zinc, or other sheathing are put on to the projecting
" copper rivets with their edges overlapping, so that the ends of

" two sheets are held by one row of rivets, and tarred felt, 'blair,' " or other similar non-conducting material is inserted between " the iron plates of the vessel and the copper or other metal " sheathing. The projecting portions of copper are then ham- " mered so as to securely rivet them."

[Printed, 10*d*. Drawing.]

A.D. 1863, March 6.—N° 641.

SPICER, HENRY REVELL.—(*Provisional protection only.*)— " Improvements in protecting and preserving the bottoms and " sides of ships, and other submerged surfaces from oxidation or " fouling by incrustation, the attachment of barnacles, the action " of animaculæ, or from any other like causes of injury." The invention consists in the application of glass, china, or porcelain to such surfaces; sheets, plates, or tiles of these materials being employed of such size and thickness as may be most suitable to the surface to be covered. " The methods by which I attach the " said sheets, plates, or tiles" " to the surfaces to be covered " must necessarily vary according to the material to be protected " and preserved, and consists of the use of cementing mediums, " such as red lead, putty, bituminous or resinous cements, or " mechanical means, such as screws, nails, or pegs, formed partly " or entirely of metal, or glass, or the employment of flanges, " dogs, or clips formed by the configuration of the said sheets, " plates, or tiles."

" Among other advantages resulting from the adoption of my " invention as applied to ships is the increase of speed obtained " by the very great reduction of the friction."

[Printed, 4*d*. No Drawings.]

A.D. 1863, March 9.—N° 655.

CLAPP, WILLIAM JOHN, and COATS, NATHANIEL.—" Im- " proved armour plates for vessels, turrets, targets, forts, and " other structures in which armour plates are or may be " used." " We have plates of iron or other suitable metal with " curved and with flat portions, and through the flat portions pass " bolts or rivets to secure the same to the framing of the vessel, " target, fort, or structure, in such manner that other curved

" plates may be placed over the said flat portions of the said first-" mentioned plates, and over the joints thereof, to cover and " protect such bolts or rivets first mentioned, the last-mentioned " curved plates being bolted or rivetted through the first-men-" tioned curved plates, or otherwise, or secured in any equivalent " manner, by which means additional strength is obtained and " the principal (and, if desired, the major part of) the joints and " bolts or rivet heads are protected, so that a " " single plate " shall not receive all the force of any projectile or striking " body, but such force be distributed over the whole of the plates, " thereby rendering them impregnable if constructed of proper " thickness. The plates aforesaid should be produced by rolling " or compressing."

[Printed, 10*d*. Drawing.]

A.D. 1863, March 1 ..—N° 665.

MULLEY, William Robinson.—" Improvements in sheathing " iron ships, caissons, and other like structures." The invention consists in attaching metal sheathing to iron ships' bottoms, caissons, and other like structures, as hereafter described. Bars of what may be called angle-tee iron are employed, i. e., iron having a single flange on one edge, and a double flange on the other. The iron is preferred to be $\frac{3}{16}$ of an inch thick, the single flange being $1\frac{1}{4}$ inches wide, and the double flanges taken together 1 inch wide only. These bars are placed vertically, and parallel to each other, about 18 inches apart on the ship's side; " I then introduce " a length of, say, $1\frac{1}{4}$ inch wood sheathing (between or im-" mediately behind the " bars, " using a portion of their rivets to " fasten them on), grooves in the ends of the sheathing corre-" sponding with the projections of the T flange formed to receive " them. I fasten one of the irons by tap screws or rivets; I then " lay on the ship's skin, hair, and tar, or any other suitable com-" position, put one end of the wood in its place, then bring the " other iron against the other end, always with the flange outwards, " and so on throughout. The ends of the separate pieces of " sheathing meeting on the tops of the irons, the whole presents " a surface as upon a wooden ship. I then caulk it and cover it " with pitch and felt, so as to render it perfectly impervious to " water."

[Printed, 8*d*. Drawing.]

A.D. 1863, March 14.—N° 696.

RICHARDSON, James Coxon.—(*Provisional protection only.*)—" Improvements in the construction of ships." "This invention " relates to a peculiar combination of wood and iron in the con- " struction of ships and vessels, whereby strength, economy, " durability, simplicity of construction, and other advantages are " obtained. It is proposed to construct the frames or ribs of " double, angle, or T iron, having the flanges on the outside with " holes punched for the reception of fastenings, such iron frames " may be galvanized or coated with paint or other material, or " otherwise protected from oxydation or not as preferred. The " space between these frames is" filled " in with short lengths of " wood plank the same thickness as the moulded size of the iron " frames, and dressed fair with the iron outside and in, or made " thicker so as to project inwards beyond the inner edge of the " iron frames, and to butt against each other, and secured by " means of iron or other rivets to the flanges of the iron frames, " or in any other manner." "If in the construction of the ship " wood be partially used for floors or transoms, or fashion or other " timbers instead of T or angle iron, or in combination with " it, so as to render the filling-in pieces of wood partly unneces- " sary, then such filling-in pieces to be only partly used. The " keel, stern, and stern post are to be of wood. The outer plank- " ing, which is to be of wood, is secured by wooden treenails or " metal bolts or other suitable fastenings, which may be rivetted " or otherwise secured on the inner work. An inner planking " may be added of wood, and all or part of the fastenings may be " driven through it from the outer planking."

[Printed, 4*d*. No Drawings.]

A.D. 1863, March 16.—N° 707.

SMETHURST, John.—(*Provisional protection only.*)—" Im- " provements in the construction of ships and vessels for the " purpose of obtaining additional strength and motive power." " The first part of my invention consists of a peculiar application " of motive power to ships or vessels, and to improvements in " the construction of such ships or vessels; and in order that " this principle may be better understood, it will be necessary to " shew the formation of the ship or vessel's bottom, which is so constructed that it shall have two or more distinct keels; but

"for the sake of illustration, I will proceed to describe a ship or "vessel of the proposed construction, the bottom of which will "have four distinct keels, so that it will be something like the "bottom of four long but narrow ships or vessels ranged side by "side, only that the space between the two centre keels will be "much larger, both in height and width, than the spaces between "the outer and centre keels; it will in fact be made sufficiently "large each way as to admit of the paddle wheel or wheels being "placed in the same midway between the fore and aft part of the "ship or vessel, and in the compartments immediately on each "side of the paddle wheel or wheels I propose fixing an engine "or engines, and also the steam boilers, and thus communicate "power to the paddle wheel or wheels at both sides of the crank "or wheel shafts." "The weight of the paddle wheel or wheels "will thus be distributed over two or more bearings on each side, "instead of one end being entirely without support, as is the "case where there is a wheel on each side of a ship or vessel. "I also propose placing a smaller paddle wheel in each of the "spaces between the outer and centre keels, each of which will "be worked by a separate engine or engines; the small paddle "wheels, besides assisting the larger in propelling the ship or "vessel, will act in place of rudder for steering the same.

"Further, in place of having the paddle wheel or wheels in the "space between the central keels, I have an arrangement in which "a wheel can be placed in each of the spaces between the outer "and central keels; or a ship or vessel could be formed with three "keels, with a paddle in the spaces between the outer and the "centre keels, each wheel either being worked by separate engines "or connected, as desired; or a ship or vessel can be thus con- "structed with only two keels with the paddle wheel or wheels "placed between the same," "the engines being in compartments "in one or both immediately on each side of the paddle wheel or "wheels.

"I also propose another system of steering, which can be applied "either separately or in addition to the above arrangements; "for such purposes in the spaces between the outer and the "centre keels where there are three or more keels to the ship or "vessel's bottom, I have suspended a swivel rudder fixed to a "vertical shaft firmly supported by bearings in the interior of the "ship or vessel, which said rudder will be so formed that where "*the blade or thin* edge of the same is placed at right angles with

" the ship or vessel's side it will exactly fit the space between the " two keels." " Each rudder will be worked by a separate wheel, " but so arranged nevertheless that one man (under ordinary cir- " cumstances) can work both rudders."

" I further propose having an inner shell throughout the whole " of the ship or vessel's bottom, which may be continued up the " several sides of the ship or vessel to such height as may be " found practical or desirable. The spaces between the outer and " inner shell will be made into water-tight compartments, but " with such an arrangement of valves and communications " between each that all or any portion of them by connection " with the exhaust steam passage of the engine or engines could " act as surface condensers."

[Printed, 4*d*. No Drawings.]

A.D. 1863, March 19.—N° 739.

CROCKER, Samuel Leonard.—" A new and useful or im- " proved yellow metal sheathing nail or spike which by means of " a nail-cutting engine is cut from yellow sheathing metal." The yellow metal above referred to is a composition of about sixty parts of copper and forty parts of zinc. It is rolled into plates of suffi- cient thickness and shape to be cut up into nails. It is such a composition as is now extensively used in lieu of sheet copper for the sheathing of navigable vessels. In consequence of the diffi- culties heretofore supposed to exist in the manufacture of yellow metal nails and spikes, it has been customary to cast or found them from a composition of copper, zinc, and some other metal, it having been discovered that nails could not be made to advantage by casting them from copper and zinc combined together in the proportions of sixty parts of the former to forty of the latter. To do so either a different proportion of copper and zinc or an addition of some other metal was required. But such nails are more brittle than those proposed, have a roughness in the head which facitates fouling, and, having a metallic constitution differ- ing from that of the sheathing, a galvanic action is produced, tending to the destruction of the metal near the holes.

" I have discovered that by heating" this composition " to " redness or thereabouts, and while so heated introducing it into " the nail or spike machine, it may be safely cut up into nail blanks, and each of said blanks be headed by the machine.

" After the nails or spikes, as the case may be, have been thus " made, they are to be again heated to or about to redness, and " when so heated they are to be plunged into cold water; in con- " sequence thereof their brittleness will be so overcome as to " render them capable of being bent or driven without that " danger of being broken under such operations as the common " cast composition nails or spikes would be subject to. This " mode of making either a nail or a spike of the yellow metal " enables me to produce one which, although it may not have but ' two-thirds the amount of metal in it that a cast composition " nail or spike may have, yet it will possess quite as much if not " more strength."

[Printed, 4*d*. No Drawings.]

A.D. 1863, March 25.—N° 776.

WHITE, JOHN.—(*Provisional protection only.*)—" Improvements " in protecting the surface of the iron and steel of ships and all " other structures, except that of cables, tanks, and boilers, while " in contact with water, from decay, in preventing or abating, " and in facilitating the removal of foulness of ships' bottoms, " and in giving a capacity of increased speed to ships." " I fix " on the surface of the iron or steel zinc or aluminium equal " in " area of surface to at least one-sixteenth part of the area of sur- " face of the iron or steel by means of iron or steel screws, rivets, " or nails, taking care that some of the points of contact of the " iron or steel and of the zinc or aluminium respectively are " clean where they are fixed together, and that they are fixed in " close contact; and for preventing or abating and for facilitating " the removal of foulness of ships' bottoms, and for giving a " capacity of increased speed to ships, I cover the surface of the " ships' bottoms while dry, by means of a plasterer's trowel or " other implement, with a composition made by melting and " mixing together equal parts of fat and oil, or about equal parts " of fat, oil, and whitelead, or one part of fat, two of oil, and " three of powdered quicklime, and from time to time, when " necessary, having scraped off the foulness (if any) from the " ships' bottoms, while dry or while afloat, I cover the ship's " bottom, while dry or while afloat, again with any one of the " said compositions, using for that purpose, where necessary, a " *diving* apparatus, and rubbing on the composition with the

" hand, and using a plasterer's trowel or other implement for " spreading it."

[Printed, 4d. No Drawings.]

A.D. 1863, March 31.—N° 829.

BELL, Archibald Hamilton, and BELL, Valentine Græme.—(*Provisional protection only.*)—" An improved mode of " constructing the armour of vessels of war." " The object of " this invention is, first, to provide the hulls of vessels of war " with a shot-proof covering of greater resisting power than has " heretofore been obtained without the use of a greater weight of " metal than can be applied, due regard being had to the buoy- " ancy of the vessel; and, secondly, to strengthen the hull of the " vessel by means of the armour covering and its supports.

" In carrying out this invention we form the shot-proof cover- " ing of alternate lines of iron and wood, and the interposed lines " of timber being sufficiently narrow to ensure the adjacent iron " bars intercepting any heavy shot that may strike the wood. " The lines of iron are divided into bars of a convenient length. " These bars are furnished at the back with projections welded on " to them, which, in pairs, form jaws of a dovetailed shape at " equal distances apart. Vertical ribs of the form hereafter " described are let into the timber backing between the skin of " the vessel and the armour, so that their exterior surfaces shall " be flush with the front of the backing at intervals corresponding " with the jaws on the armour bars. These ribs carry alternately " on their face throughout their length a dovetailed form, in cross " section, corresponding in length with the depth of the iron bars, " and for a length equal to the space between the iron bars a " flange with parallel faces. The dovetailed projections fit into " the jaws of the armour bars, and the spaces between these pro- " jections allow of the jaws on the armour bars passing freely on " and off the vertical ribs. The vertical ribs being fixed in their " places and secured to the framework of the vessel by bolts, the " armour bars are inserted in the spaces left for that purpose in " the verticals and lowered down until the jaws clip the dovetailed " portions of the ribs, the intermediate timbers being built up " alternately with the iron bars. Keys which clip the vertical " ribs are *driven in between* the lines of bars, securing them firmly " *in their positions.* The armour bars are arranged so as to break

" joint one above the other, by which means the armour becomes " a self-supporting structure round the vessel."

[Printed, 4*d*. No Drawings.]

A.D. 1863, April 1.—N° 841.

MITCHELL, WILLIAM.—(*A communication from James Mitchell.*) —" An improved process for coating iron." The invention relates to a novel mode of coating articles of iron with protecting or lustrous metals, such as copper, gold, silver, nickel, zinc, tin, antimony, and bismuth, and their alloys, so as to effect an intimate combination of the covered and covering metals, whereby all tendency to galvanic action between the iron and the covering metal or alloy will be removed.

" The iron should be the best charcoal bloom, sound and free " from blister, and of uniform temper for making what I shall " denominate bronze iron; for spikes, bolts, bars, braces, bands, " or other appliances for ship-building, the iron should be good " common sound iron."

The inventor having described the manner of preparing the iron, so as to obtain smooth and clear surfaces, and the best description of furnace to be used, proceeds to describe the bath.

It has been found by experience, he states, " that in forming " alloys a more solid and perfect alloy will be obtained by using " the salts of sulphur or arsenic in a modified form, so as to pro- " duce a slight negative action without injuring in any degree " the tenacity of the alloy, and that pure metals will more readily " combine with iron or with each other through the agency of " the salts above mentioned. The furnace is to be filled with " such metal as it is desired to employ to a level with the bottom " of the door sill; to make it convenient for use, and to prevent " oxidation and evaporation, the surface must be covered with a " slag for its protection formed of sand and clay mixed to a " proper consistency. When about to use the bath, the slag is " to be pushed back with a ravel some three or four inches, and " the space filled with borax. This will aid as a flux for the " iron, and keep the metal in a fluid state, thereby insuring a " smooth surface for the coated article of iron.

" The manner of operating with the prepared iron plates in the " bath is as follows:—Seize hold of the plate with suitable " tongs, and plunge it into the bath of metal through the melted " borax to the depth of more than half its length, and in a short

" time raise it up and down in the metal bath, and observe the " progress of amalgamation until it is perfect, when it will exhibit " a very brilliant luminous appearance; then withdraw the plate, " handling it quickly, in such a manner as to make the metal " spread evenly on the surface, hold it up, and give the fluid " metal a chance to retain an even thickness in the centre of the " plate; then lay it on a turntable, and quickly dip the other end " of the plate in the metal bath, using care that the metallic " coating shall join perfectly in the centre."

In preparing the cleaned plates or other articles for immersion in the molten metal, a second vat, lined with sheet lead, and of sufficient size to admit of the complete immersion of the metal plates or other articles, is provided to contain a bath composed of diluted sulphuric acid, and oxide of copper, or the sulphate of copper (common blue vitriol of commerce). In this solution the plates or other articles to be bronzed or coated are immersed and retained until their surface exhibits a precipitated metallic surface of copper. This covering is a hydrated compound of sulphate of iron and metallic copper, which, when plunged into a bath of molten metal, acts as a flux on the iron, and produces immediate molecular action and separation at a temperature much below a welding heat, the result being an union of the fluid molecules of both metals. The coated iron articles, as taken from the oxide of copper or sulphate of copper bath, are next immersed in a saturated solution of alum, to protect the compound covering from oxidation while warming before dipping into the bronze or molten metal bath.

These bronze iron sheets will be found useful in many appliances where sheet-copper, iron, or brass is now used, in all parts of the construction of ships and other water craft.

[Printed, 4*d*. No Drawings.]

A.D. 1863, April 3.—N° 845.

PHILLIPS, William Henry.—"Improvements in means or " apparatus for cleaning the bottoms of ships or other floating " vessels." "This invention has for its object arrangements of " apparatus for facilitating the cleaning of the bottoms and sides " of ships or other floating vessels, so as to remove any accumu- " lation of seaweed, barnacles, or other foreign matters therefrom " whilst the vessel is afloat or during its progress through the " *water. For this purpose* the form of apparatus which I prefer

" to employ consists of a circular frame or disc revolving freely " upon a central axis carried by a suitable framing or support, " capable of being suspended from the deck (by one or more " ropes or chains passing around or underneath the vessel), and " pressed against the bottom or side of the vessel to be cleaned " when required. This framing may also be guided or stayed by " chains or ropes passing fore and aft from it to either end of the " ship, which chains or ropes may be used to give the brush a " fore-and-aft movement, if desired, when in use. The surface " of the frame or disc which is thus pressed up against the " bottom or side of the vessel is of a brush-like character, com- " posed of cane, whalebone, wire, or other elastic or yielding " materials combined or otherwise with blades or rigid projections, " if desired. To the outer surface of the frame or disc is attached " a self-acting revolving apparatus, but I prefer to use a series of " vanes or blades, which revolve as the vessel is propelled through " the water, and cause the apparatus mounted upon the axis to " revolve by being connected to them by suitable gearing as the " vessel so passes through the water, or they may be caused to " rotate by the action of the tide when the vessel is stationary. " The apparatus is capable of being shifted from one position to " another by a crab, capstan, winch, or other means acting on the " chains or ropes which support or suspend the apparatus. In " place of attaching the brush or rubbing surface to the rotating " disc by gearing, as above described, it may be separate therefrom, " and have an oscillating or to-and-fro movement imparted thereto " by means of a crank or other gearing connecting the revolving " disc and the brush or cleaning instrument together. By this " means a chipping or chopping-off action may be given to the " cleaning instrument. Where the vessel is in still water motion " may be communicated to the revolving brush or cleaning instru- " ment by means of a driving band passing over a drum or pulley " on the axis of the series of vanes or blades actuating the " revolving disc to another drum or pulley mounted upon and " driven from the deck of the vessel, or from a raft, barge, or " other floating body lying alongside the vessel. The rotating " brush or cleaning surface may be formed around the circum- " ference of a drum having a central axis, to which rotary motion " may be given by similar means to those previously described."

[Printed, 10*d*. Drawing.]

A.D. 1863, April 2.—N° 848.

SUTHERLAND, DOUGLAS SYMONDS.—" Improvements in " protecting vessels of war and fortifications from the effects of " projectiles." The object of the invention is, first, " the protec- " tion by certain means of those portions of a vessel or fortifica- " tion which are exposed to the effects of artillery. I have, after " careful investigation, assisted by experiment, ascertained that " sand when securely confined within boundaries which prevent " its escape from a pressure applied to it is practically incom- " pressible, and from the mobility of the particles composing it " is capable of transmitting and distributing a pressure or blow " given to any part of a mass so confined over the whole or great " part of such mass. These properties of sand may with great " advantage be employed in combination with armour plating, as " a means of protecting surfaces from the effects of projectiles. " The arrangements employed for these purposes may be greatly " varied. I, however, prefer the following arrangement for com- " bining the use of armour plating with the employment of sand " confined from escape in all directions, for protecting ships and " forts."

" I form the inside of a vessel or fortification of single plating, " or by preference double plating, of metal rivetted together, and " in constructing a ship or floating fort I attach the inner fram- " ing to the deck beams by means of braces of T section."

" To the outside of the double inner plating I attach" in parallel rows plates or strips of what may be called rectilinear corrugated iron, of a form which might be produced by stamping strips into a series of trough sections, with parallel sides rather deeper than the interval between them, and then elongating the strips so as to incline the sides to each other. These rows of corrugated strips are united by straight strips crossing them, in contact with and rivetted to their inclined sides.

Over the outer surface of this corrugated material another skin is worked (of steel, by preference,) which is parallel with the inner plates, and is secured to the apices of the triangular figures formed by the strips. The joints are covered (where they occur) on the inside, and the rivets are countersunk on the outside, so that this skin shows a smooth flush face to the outside. Outside this skin are oblong cases of metal, containing sand and the armour plates. These plates are *fastened* to the side by means of fastening plates

between their joints, dispensing with the usual through bolts, hence no holes are required to be bored for them within the area of the plates.

The mode of building up the side may be thus described:—The inner plating being attached to the deck beams, the horizontal and vertical strips are attached to it. The intermediate skin with the flush outer sides, being connected with the inner skin by the lattice-work formed by the strips; this is carried up to a height of 4, 5, or 6 feet. At the lowest point of the armour, and resting on a suitable bearing, a set of fastening plates are then passed into their proper position. These fastening plates consist of a continuous bar or wedge plate, introduced between the edges of the armour plates, and holding them in by its dovetailed or wedged sides. From the inside of this bar a series of flat bolts pass through the intermediate and inner skins, and are received on the inside by strengthening plates and angle irons, against which they are keyed by a continuous row of wedge keys, so that the fastening forms a continuous line on the inside as well as on the outside, and is finally riveted up. Between these bars and against the intermediate plates, the sand cases are placed, and in contact with them, and resting on the heads of the bars, the armour plates. Another set of fastening plates are then passed to their places, and also similar ones at the vertical joints, and they are to be secured as before. Sand is then carefully packed between the inner and intermediate skins so as to exclude, as much as may be, the atmosphere, care being taken to give a thorough coat of pitch, tar, oil, or some similar substance to each part of the structure as the work proceeds. The plates and the strips may then be carried higher up, and other sand cases and armour plates placed and fixed in position. Other fastening plates are introduced, and more sand is packed in the space, and so on until the side is built up to the required height.

[Printed, 10*d*. Drawing.]

A.D. 1863, April 2.—N° 851.

JONES, William.—(*Provisional protection only.*)—" Improvements in the construction of ships or vessels, part of which " improvements are also applicable for constructing buildings, " and for various other purposes in which rolled iron is employed." The invention relates, first, " to rolling bar or angle " *iron with* shoulders or recesses, against or in which correspond-

" ing parts of a contiguous bar will fit, and add greatly to the " strength, rigidity, and stiffness of the structure. For many parts " of iron ships the iron is to be rolled with a recessed shoulder, " against which the edge of the contiguous plate will butt, and " thereby offer a considerably greater resistance to end pressure " than when a joint simply depends on the rivets. It will be " obvious that iron rolled upon this principle may be advan- " tageously employed for various other purposes besides ship- " building; for instance, it may be used in constructing houses, " bridges, and other buildings, or for forming the framework " of machines. For the keels of ships I propose to roll the " bars in pairs, one part of which will have a projecting rib, while " the other part will have a recessed groove rolled in it to receive " the projecting rib of the other part. When the pairs of bars " are firmly bolted or rivetted together with break joints, a keel of " very great strength will be produced. Moreover, these keel " bars are rolled of such a section, that when brought together and " properly secured in the form of a keel, as already mentioned, a " channel or way for the free passage of water along the keel will " be obtained."

And, secondly, to the construction or building of ships or vessels, more especially ships of war, whether employed for ocean navigation or simply to act as floating batteries of great strength. For vessels requiring a keel, this part of the ship is formed as above described. On the top of the side flanges of this keel are bolted or rivetted the garboard strake plates, which are made of thick plate iron, of sufficient strength to receive the angle iron flooring bars, which may, if desired, be made with butt and shoulder joints, so as to assist in resisting the endway strain. For iron-clad or armour-plated ships or floating batteries, "I construct the " vessels with inner and outer skins, which are connected together " with bars of angle iron, constructed on the butt and shoulder " principle already described. These angle iron bars are arranged " diagonally alternately in opposite directions, the ends of the " diagonals being made to butt against the shoulders of the end " pieces, which are rivetted to the inner and outer skins. The " spaces between the diagonal bars and the outer and inner skins " of the vessel are filled in with hard wood blocks or other suit- " able material."

" The armour plating may be placed either all externally or partly " inside and *partly outside* the vessel, as may be preferred, but

"the lower part or bottom of the vessel should be sheathed with "wood, in order to be coppered."

"In constructing iron-clad floating batteries, the upper part is "made convex, and a well or vertical hole is made down through "the vessel for the convenience of working an anchor or a pro-"peller. Openings may be made to communicate from the "interior of the vessel to this open well, for the purpose of venti-"lation. A narrow gallery is constructed round the vessel, so as "to enable the occupants to get into or out of boats, or for other "purposes."

[Printed, 4d. No Drawings.]

A.D. 1863, April 9.—N° 897.

HETT, Alexander, and BASSET, Frederick William.—"Improvements in preventing the fouling of ships' bottoms and "in cleansing the same when fouled." The improvements consist "in the application of water raised to a sufficiently high "degree of temperature, or of steam, or of either hot or cold "water charged with metallic salts, or other poisonous sub-"ances, such as arsenic (for instance), or of hot air, smoke, or "of carbonic acid or other suitable gases to the external surface "or covering of a ship's bottom, in such a manner that they are "brought in contact with and exert an influence over any animal "or vegetable organism which may have attached itself or become "attached thereto, either destroying life therein or causing the "loosening of its attachment to the bottom."

"When we make use of hot water, hot air, smoke, or gas, we "first raise these bodies to a sufficiently high degree of tempera-"ture, such, for instance, as from 110 degrees Fahrenheit up-"wards," "and then we force them by means of a pump or fan or by the pressure of steam "through suitable pipes or conduits "to any part of the ship's bottom to which they are to be applied In the case of steam vessels, "we take advantage and make use "of the hot water which is blown off or discharged from the boilers "in the usual course of working; we likewise use the heated "air and smoke, together with the other products of combustion "which are found in and may be easily obtained from the smoke "stacks or chimneys." "The pipes, tubes, or conduits are to "have holes or apertures at suitable distances for the escape and "*even* distribution of the water, smoke, hot air, or gases. The

" pipes or conduits employed may be either permanent appliances " fixed to the ships' bottoms or so constructed as to be appiied " and removed at pleasure."

" In some cases we make a second metallic skin or covering to " the vessel at a short distance from the usual outer or main one, " and between these two we force in hot water, steam, hot air, or " smoke, which, by heating the external surface of the outermost " skin or covering, will produce the same effect as if they were " applied directly to the external surface of the ship's bottom."

[Printed, 4*d*. No Drawings.]

A.D. 1863, April 9.—N° 900.

BURTON, JAMES RYDER.—(*Provisional protection only.*)—" A " new method of and apparatus for cleansing ships' bottoms." " This invention consists of a semi-circular tube varying from 3 " to 6 feet in length, to be proportioned to the size of the ship, " and 2½ to 3½ in width, according to the length of the machine, " i.e., the tube." " The depth of this semi-circular tube, to be two " feet deep and flat at the top to receive the brush, which should " be made of whalebone and fixed to a wooden frame, and which " wooden frame will be fastened on the tube by iron straps, with " eyes at each end to receive a screw to fasten such straps. By " this plan a fresh brush can at any time replace the old one when " worn out. The tube will require 3 handles at each end and 6 " on each side to attach ropes to work the machine."

" When the ships' bottoms are very foul and require more than " a brush to remove the weeds or shells, an iron plate can be " screwed on at each end of the machine to act as a scraper to " tear all obstructions away."

" The power of the pressure will be in proportion to the depth " or size of the tube."

[Printed, 4*d*. No Drawings.]

A.D. 1863, April 10.—N° 910.

SMITH, ROBERT.—" An improved medicated oil for the preser- " vation of metal, wood, or stone." The invention consists of " an improved compound, herein-after described, to be used, either " alone or in combination with any description of paint, for the " preservation of iron or wooden ships, buildings, or articles " made of metal, wood, or stone, and is also applicable for the

" renovating of oil paintings and paintwork, and is composed " of the following ingredients: — I take, say, one gallon of any " description of oil, and a like quantity of water, to which I add " about 2 pounds of saltpetre, salt, or soda, either mixed or sepa- " rate. If the compound is intended for the preservation of stone, " I add about 2 pounds of soluble sulphur."

[Printed, 4d. No Drawings.]

A.D. 1863, April 10.—N° 914.

CAUDWELL, Henry.—" Improvements in the construction of " vessels of war, part of which improvements is applicable to " fortifications." " The chief object of this invention is so to " construct ships of war that they shall provide ample facilities " for working broadside guns, while effectual protection is afforded " to the crew and also to the hull of the ship, access to the upper " deck by boarders being provided against. The hull of war vessels " I propose to construct with a curved projecting lip of wrought " iron running round it just above the water line. This project- " ing lip will serve, in case of a collision, as a protection, and it " may with advantage be overlaid with an elastic covering of any " suitable material." " To ensure the advantage of a circum- " scribing lip for protecting the hulls of vessels of comparatively " small tonnage, I propose to make the lip hollow," " and to fill " up the space between it and the skin of the vessel with an " elastic or other packing of lighter specific gravity than iron. " This packing I continue down below the water line to form a " backing to the vertical armour plates." " The deck of the " vessel I protect with a sloping or pitched roof, formed of plates " of wrought iron. Along the sides of the roof, at suitable dis- " tances apart, are broad corrugations or rounded projecting ribs, " which run upwards from the hull." These corrugations are pierced to form portholes for the guns, which are planted behind the recesses, ready to be moved forward into the recesses, when sliding metal shutters are raised to allow of the muzzles of the guns being projected through the port-holes. These shutters are made shot-proof. They consist simply of plates of iron or steel let into parallel rebated grooves formed in the edges of the pierced armour plates, and connected together by latches on their inner face. Attached to the uppermost plate is a chain which passes upwards along the deck roof to a roller within the roof,

and is thence brought down to a capstan on the deck. When, therefore, it is intended to fire the gun at an elevation, the lower plates of the shutter are detached from the upper plates, and only the upper plates are elevated; but when the gun is required to be depressed, all the plates must be raised to allow of that depression.

" Between the corrugated ribs I propose also to construct aper- " tures for the purpose of throwing out shells from mortars. " The upper portion or ridge of the roof of the deck I construct " of removable iron gratings, which I cover with sliding shutters. " The space thus capable of being uncovered at pleasure serves " the purpose of ingress and egress, and also for the taking in of " guns, ammunition, and provisions. The corrugated ribs may " terminate in a shot-proof dome or cone, provided with an iron " door for ingress and egress, and from these domes sights may " be taken and the look-out kept up. I also propose to provide " a temporary upper deck to be set above the inclined roof, and " used in fine weather as a promenade or for other purposes, as " considered convenient, and removed when not required."

" The screws and blocks of the gun carriages I make capable " of elevating the guns to any point, in accordance with the for- " mation of the portholes.

"The invention also applies to the protection of forts or land " defences, the corrugated roofing being in this case applied to " the covering of the exposed faces of the land defences."

[Printed, 1s. 4d. Drawings.]

A.D. 1863, April 20.—N° 984. (* *)

HUGHES, EBENEZER WILLIAM.—" Improvements in turn- " tables, turnbridges, and ships."

The leading feature of the invention is the employment of spheres, on which the article to be moved rests, these spheres working in a grooved channel, and being kept at proper intervals apart by wheels. In applying this invention to a slip and carriage for drawing up vessels out of water, a grooved rail is laid along the upper surface of the slip, and the lower side of the carriage is furnished with blocks, which are grooved to correspond with such rail, the spheres on which the carriage travels working in the grooved portions of the rail and of the blocks. On each side of the groove in the rail is a rib or projection, and on these projec-

tions rest wheels mounted on short axes, each of these axes carrying a loose wheel or pulley, and these loose wheels or pulleys interposing between the spheres, and keeping them the proper distance apart. These axes themselves are maintained in due position by endless chains, to which the ends of the axes are connected. Different modifications of the invention are described.

[Printed, 10*d*. Drawing.]

A.D. 1863, April 24.—N° 1015.

DAINES, John Benjamin.—" Improvements in the prepara-
" tion of stone, plaster, compo, iron, wood, and such like sub-
" stances, so as to preserve them from decay." This invention relates not only to the treatment of such substances, so as to preserve them from decay, but also to the embellishment of a variety of articles composed of stone, plaster, or cement, of the interior walls, and floors, and ceilings of buildings, and especially to the preparation of grounds for fresco painting.

One solution is prepared by mixing together animal gall, liquor calcis, and liquor from boiling potatoes.

A second solution, of sulphur and camphor, is obtained by the use of a combination of mineral and linseed oils, or other suitable solvents compatible with the nature of the material under treatment.

The surfaces having been cleansed, when necessary, by a solution of an alkali, and the alkali neutralized by a very weak acid, and thoroughly washed with water, " I then apply each of these
" solutions by the aid of a brush, in the same manner as in
" painting, or by some such similar manner, to their surfaces;
" but in the case of timber for ships or other uses, statuary and
" other portable articles, where it may be desirable to thoroughly
" saturate them, the solutions may be injected by means of an
" exhausted receiver."

[Printed, 4*d*. No Drawings.]

A.D. 1863, May 5.—N° 1124.

GLOVER, William.—" Improvements in means or apparatus
" to facilitate the steering of ships and other vessels." " Upon
" the axis of the steering wheel I apply another wheel, toothed or
" otherwise formed to hold the parts of a chain or rope, which is
" thence guided by suitable pulleys, and has its opposite ends

" made fast to the circumference of a wheel applied to the rudder " head or to the axis of motion of the rudder. Thus by acting " on the steering wheel, motion is through the single rope or " chain communicated direct to the rudder. By these means a " slack chain is avoided, and the power exerted is more imme- " diately effective."

[Printed, 1*s*. Drawings.]

A.D. 1863, May 9.—N° 1171.

WOOD, JOHN BLAND.—(*Provisional protection only.*)—" Im- " provements applicable to the defending of ships or vessels and " forts when armour plating is employed." The object of this invention is " to apply in combination with and as a backing to " armour plating, thick sheets, blocks, or masses of the hides of " buffalos or other animals, which are first disintegrated or ground " into a plastic condition, and then formed into sheets, blocks, or " masses suitable for being interposed as a backing between the " armour plating and the body of a ship, vessel, or fort. By " these means the armour plating will be better sustained against " the effects of impact than when employing wood or other sub- " stances liable to split, and at the same time, in the event of a " shot or projectile passing through the armour plating and the " backing, the hole produced in the backing will be more readily " stopped than when using wood or any of the other backing " substances which have heretofore been employed."

[Printed, 4*d*. No Drawings.]

A.D. 1863, May 11.—N° 1181.

VAN TENAC, CHARLES LOUIS.—(*Provisional protection only.*) —" Armour plates of hammered or rolled wrought iron, the " whole of the rivets being protected against the direct blows " from the cannon shots."

The inventor shews three forms of armour plates in which the fastening is protected from the direct blows of shot.

In the first there are two horizontal sets of plates, inner and outer; the inner set are like railway bars with broad flanges at the base. Their depth is about half the whole thickness of the armour. These rails are fastened by bolts with countersunk heads, passing quite through the rail. The rails are placed at intervals corresponding with the breadths of the outer plates, so

that the whole set may be locked together. For example, one of the rails or inner plates is bolted to the side, and then an outer plate is brought against it, the side of the latter being grooved to the shape of the side of the former, so that they will lock. The next rail is then worked; the edge of its flange locks into the corresponding edge of the flange of the adjacent rail, and its head fits into the remaining side of the outer plate, and so on.

In the second mode there is only one thickness of armour, the sides of which are rabbetted and hollowed, and the fastening bolts pass through the lip of the rabbet. A longitudinal strip with rounded sides is however interposed to receive the countersinks of all bolts; this strip lies upon the lip of the rabbet, and fits into the sides of the plates.

In the third system the plates are rabbetted, and are fastened through the lips of the rabbets, but without the strips. As soon as one of these lips is fastened, a thinner intermediate plate is worked resting on the lip, and extending also over the lip of the next plate, not yet worked, which is inserted beneath it. The base of this intermediate plate is rabbetted or spread out sideways, and locks into the edges of the plates on each side of it. The flange of the intermediate plate, on the side towards the plate not worked, receives bolt fastenings before this latter plate is worked, and the edge of this latter plate has places cut out of its edge or lip, to allow this edge to slide up under the plate and between the bolts.

In all three cases the outer surface of the plating is flush.

[Printed, 8*d*. Drawing.]

A.D. 1863, May 16.—N° 1231.

TALBOT, Robert.—" A folding rudder for steering barges in " the river Thames or coastwise." " The rudder of a barge at " the present time is usually made of one length without the " means of reducing it, which is of great disadvantage in enter- " ing the locks of different canals. The improvement I propose " therefore is to have a folding piece from the centre, so as to " shorten it about four feet, giving the barge the advan- " tage of about four feet more in length while in lock, and " also" enabling it " to carry about seven ton more than one " with the usually made rudder, the said improvement causing a " much less draught of water when the barge is loaded. I also

" consider it will be of great advantage to coasting barges, which " under the present system often become unmanageable in foul " weather in consequence of the rudder being too long for " the efficient control of one man.

[Printed, 1*s*. Drawings.]

A.D. 1863, May 16.—N° 1232.

BURNS, Frederick Maun.—(*Letters Patent void for want of Final Specification.*)—" Improvements in preventing the fouling of " the bottoms and sides of ships and vessels, particularly " applicable to ships and vessels constructed of or sheathed " with iron." " I have a tank or receptacle for oil or other " oleaginous substance fitted in any convenient part of the " vessel, or if iron masts be used their interiors can be made " available for containing the oil or oleaginous substances. From " this tank or receptacle a pipe or pipes lead to pipes or channels " on each side of the keel, or at each side of the cutwater, or " otherwise, such channels or pipes being perforated with numer- " ous small apertures, through which apertures the oil shall ooze " out, and thence ascend and keep the sides and bottom well " greased, which will effectually prevent the adhesion of barnacles " and other marine animals and plants.

" Before leaving the dry dock I propose to oil or grease the " sides and bottom of the vessel, in order to prepare the same to " cause the oil or oleaginous substance the more readily to adhere " to the sides and bottom of the vessel.

" When applied to wooden ships iron sheathing could be used " with the arrangements above described, thereby obviating the " necessity of using copper or other expensive sheathing."

[Printed, 4*d*. No Drawings.]

A.D. 1863, May 19.—N° 1256.

PARKER, Abraham.—(*A communication from James Partridge.*) —" An improved apparatus for saving from destruction by fire " persons and property in houses, buildings, and ships, and also " for ventilating ships." " In ships or vessels portable force and " lift pumps will be required for the main decks to draw water " from the sea, and force the same through gun barrel pipes or

" tubing" (made of wrought iron or other hard malleable metal) " of two or three inches diameter (but varying according to the " size of the vessel), into smaller pipes or tubing perforated with " three or four rows of holes, and fixed from stem to stern of the " ship in different lengths, one line being under the centre " of each deck, but to be bent round the masts and hatchways; " also to fix the same kind of perforated pipe along the under- " neath part of the deck about two feet from each side of the " vessel in different lengths, each three lengths in a row to be " connected with cross pieces of perforated pipe underneath the " deck from side to side. The cross pieces to be connected with " the ends of each pipe at the side with easy bends of perforated " pipe. The top of the feed pipes should have a brass flange " screwed to the deck to be connected with pumps," " which " flange should also be provided with cap screw to be attached " when pumps are not required, such feed pipes branching off with " easy bend to the perforated pipes. The feed pipes which " descend to the lower deck or hold should be separated from " those described above, but arranged, perforated, and connected " in the same way as those described between decks, and to fit " the same pumps so that upon the discovery of fire in the lower " part of the ship water may be brought to bear upon it without " disturbing the hatches or port holes. The poop decks to be " fitted in the same way, but with one length of plain pipe pass- " ing through each row of cabins, with a rose or short piece of " perforated pipe to each cabin branched on to the plain pipe with " perforated ends. The saloons to be fitted with one length of " perforated pipe, passing up the centre of the underneath part of " the ceiling or deck above. For small vessels the centre per- " forated pipe may be dispensed with. For vessels of deep " draught some of the water may be sprung from the sea by " means of cocks or injections similar to those which are placed " at the bottom of steam ships. In order to use this apparatus " for ventilating ships, a branch of pipe or tubing must be con- " nected with each feed pipe on each side of the vessel below the " main deck, passing up through the same as near the bulwarks " as practicable, and connected with a flange screwed to the " upper part of the main deck and having screw caps. Into each " of these flanges another pipe or tube will be screwed, having a " stop-cock in a convenient position to shut off the water in case " *of fire, and* having also a bend at the top, such pipe or tube not

" to exceed in length the distance between the flanges and timber " head of the bulwarks."

[Printed, 4d. No Drawings.]

A.D. 1863, May 21.—N° 1273.

WARREN, FREDERIC PELHAM.—" Improvements in attaching " copper or other sheathing to iron vessels." With this object the parts of the vessel to be sheathed are covered with a coating of fibrous or other non-conducting material, in order to insulate the iron of the vessel, or iron which may be attached thereto or connected therewith, from the metal or composition of metals constituting the sheathing, "as long practised in Her Majesty's " dockyard at Portsmouth in coppering iron-fastened vessels. In " order to attach this coating of fibrous or other non-conducting " material, I prefer, firstly, to roughen the surface of the iron " either by milling or otherwise, so as to increase the holding " effect of the adhesive material or composition employed for " holding or attaching the non-conducting material to the vessel, " and which may consist either of pitch or any other suitable " substance or composition; the one I at present consider most " suitable and best adapted to the purpose being that known as " Hay's patent waterproof glue. A second coating of fibrous or " other non-conducting material may then, if required, be " similarly attached by adhesive material to the sheathing plates " intended to be applied to the vessel, the inner surfaccs of such " plates having been first roughened by milling or otherwise to " increase the adhesion of the non-conducting material to them. " In proceeding to apply the plates of sheathing beginning at " the upper row thereof, I drill the plates intended to be joined " together near to their edges with corresponding rows of holes, " and successively attach them to each other upon the coating of " non-conducting material attached to the vessel by means of " a " split or bent nail or rivet," " they (the plates of sheathing) being " successively attached to the coating referred to by means of any " suitable adhesive substance." The form of the nails or rivets, which are of copper or other suitable material, is such as to cause them on being passed through the holes drilled or punched around the edges of the plates and driven home, to become (on coming in contact with the non-conducting material attached to the vessel) turned out or clenched so as to hold the plates firmly

together. "According to this plan of attaching a coating of "non-conducting material to the sheathing plates previous to "their application to the vessel, as well as to the vessel itself, the "clenching of the rivets will take place between the two coatings, "and the prong or prongs of the clench will be embedded "between them. I find, however, that in practice it is sufficient "to attach a strong coating of non-conducting material to the "vessel itself, and then to attach the roughened sheathing plates "successively by means of a suitable adhesive material to its "outer surface, uniting them to each other by means of the bent "nails or rivets passed through the corresponding rows of holes "drilled near to their edges and driven home, so as to clench "against the non-conducting material attached to the vessel."

The upper edges of the non-conducting material, in addition to being attached to the vessel by the adhesive substance, may be secured and pressed against it by means of a band of galvanized iron or other suitable material. This band, like the side of the vessel itself, is covered with a coating of felt, fearnought, or other non-conducting material, and is held to or pressed against the non-conducting material attached to the vessel's side by screws tapped into the iron plating, coating, or side of the vessel, and having heads countersunk into the band. Before tightening the band up to the vessel, one edge of the upper row of sheathing plates is to be interposed between the non-conducting material covering the band and that which is attached to the side of the vessel. The band is then to be screwed tightly up, thus pressing and holding the edges or borders of the sheathing plates, as in a vice, between the two surfaces of non-conducting material. The sheathing is then to be turned or bent over the top of the band, and secured to the non-conducting material, by which the band is covered, with any suitable adhesive material or composition. The part of the sheathing where bent over is protected by a cleat or band of wood or other suitable material.

Or "I make use of a narrow band or belt, of copper or other "sheathing metal or composition (which I prefer should be of "greater thickness than the ordinary sheathing plates), and which "I secure to the vessel by means of copper or other screws (not "liable to act galvanically with the sheathing), tapped into screws "formed of wood or other suitable non-conducting material, "screwed" "into the armour plating or side of the vessel. In "*joining the several* plates forming the belt or band above

" referred to, I prefer to reduce each plate to a certain distance
" from its edge to a thickness of about one-half that of the body
" of the plate, and to bring these reduced edges together," " so
" that the part at which they are joined may not be thicker than
" the body of the plate."

Or strong ribs may be formed upon or attached to the upper edges of the top row of sheathing plates. These plates are laid upon and caused to adhere to a coating of felt, fearnought, or other non-conducting material attached to the vessel, as previously described, and are secured by a belt or band of galvanized iron formed with a groove or channel to receive the rib, and lined with non-conducting material, so as to prevent contact between the sheathing and the band. The band is secured to the vessel or armour plate or coating, and caused to press the sheathing between the two coatings of non-conducting material by screws tapped into the vessel or armour plating, and passing through holes formed in the sheathing, and which holes are of sufficient size to prevent chance of contact between the sheathing and the screws.

Or the rib may be formed by rolling up the edges of the upper row of plates of sheathing until the required thickness is attained.

Or, lastly, the upper edges of the non-conducting material and sheathing may be secured by means of a band or belt formed of wood, which, by means of screws tapped into the side or armour plating of the vessel, is made to press and hold them against a fillet or backing piece of wood or other non-conducting material.

[Printed, 10*d*. Drawing.]

A.D. 1863, May 28.—N° 1340.

CARTWRIGHT, Henry.—" Improvements in apparatus for
" steering vessels." The invention relates to " the mode of
" working rudders and screw propeller frames, and consists in
" the adaptation and application of the mechanism, herein-after
" described, to the tiller of the rudder, or to a lever fixed to the
" frame of the screw propeller, for the purpose of turning such
" rudder or frame in the manner required for steering the
" vessel.

" The said mechanism consists of a screw or screwed rod passing
" through a nut, which is pivotted on the inner end of the tiller

" or the lever, such screw or screwed rod being connected at one " end to a driving shaft by means of an universal joint. By this " means, on the revolution of such shaft, the screw or screwed rod " will be turned, and will work the tiller or the lever in the " direction required, according to the direction in which the screw " is caused to turn. The nut on the end of the tiller or the lever " is mounted on two pivots, one at the top and the other at the " bottom, fixed in suitable bearings, in order to allow for the " variations in the position of the tiller or the lever as it is acted " upon by the screw or screwed rod; and a slot and pin, or other " suitable contrivance, are adapted to the box or carrier for the " nut, and the end of the tiller or the lever to which it is applied " for the purpose of preventing any undue strain upon either one " of the pivots owing to any deviation of the tiller or the lever " from the horizontal. The driving shaft may be variously driven; " but I prefer to make it a short shaft mounted in bearings on a " frame fixed to the deck, and to drive it from another short shaft " mounted in the same frame, to which second shaft is connected " a small donkey engine for the purpose of working it; the two " shafts being connected by two cog wheels, which I prefer to " make of different diameters for the purpose of adapting the speed " of the engine to that of the screw, as may be required."

[Printed, 8*d*. Drawing.]

A.D. 1863, June 1.—N° 1364.

CHALMERS, JAMES.—" Improvements in armour for forts and " floating batteries." "This invention has for its object to " combine economy in cost with strength, and seeks to attain the " desired end, chiefly, by using for the major part of the armour " thin plates or bars, which are comparatively low priced, instead " of such massive and expensive plates or slabs as are generally " used in structures intended to resist heavy ordnance." With this object, the backing to support the armour plates shall consist of layers of iron plates, so manufactured that they will bind or unite into a compact body when built up and forced together; and for this purpose it is proposed to use iron of I section, with intermediate bars, from which the heads or flanges in the former section are absent. The breadth of the heads in the I sections to be about twice the thickness of their webs, and also of the intermediate bars, or any other suitable section may be employed that will

bind when two plates are laid together. These plates or bars may be of any convenient length, from 6 to 12 inches broad, and from ½″ to 2 inches in thickness, all more or less. Such plates or bars when put together make up a continuous solid mass of iron backing.

"I propose in binding these layers together to use vertical "bolts, such as I have described in my invention for 'Improve- "'ments in the use, combination, and application of iron and "'timber as armour for vessels of war and fortifications,' and for "which I obtained Her Majesty's Letters Patent, N° 3105, "bearing date the 19th day of November 1862. Or I may use "bolts in one length; or the layers of backing may be put "together without bolts. I also propose in putting the layers "together to use some such substance as india-rubber glue "between them to fill interstices, prevent rust, and aid cohesion. "This backing should have its inner surface bearing upon an "intermediate or second armour plate, such as I have described "in my invention aforesaid, but as it is not advisable to intro- "duce a perishable material like timber into permanent structures "if avoidable, I propose to place between the second armour "plate and the structure to be protected by armour a layer or "layers of felt, or some other yielding substance, to counteract "rigidity; but when practicable, I prefer to use timber for the "back cushion, as described in my said invention. I propose "that the whole armour, consisting of the outer armour plate, "the layers of backing, the second plate and cushion, be attached "to the structure by bolts having screws and nuts, such as I have "described in my invention aforesaid; or it may be attached by "fastening bars, such as are also described in the said invention, "or by other methods of fastening. To prevent rust, assist "cohesion, and lessen rigidity, I propose to use a coating of some "such substance as before mentioned between the different parts "of the armour. At all portholes I propose to have as few joinings "around or about the hole as possible, and for this purpose I "would prefer to cut the hole out of the centre of a large plate, "or cut half of the hole out of the edges of each of two plates "which come together, or otherwise I would increase the thick- "ness of any small plates that were required to complete the "hole, and allow their edges to dovetail, or match into, lap over, "or rest upon the large plates forming the other sides of the "porthole."

An improved mode of attaching armour to stoneworks is also described.

[Printed, 8*d*. Drawing and Woodcut.]

A.D. 1863, June 8.—N° 1414.

MILLER, WILLIAM.—(*Provisional protection only.*)—" An improved mode of constructing ships, vessels, or boats, and of " apportioning their freight to that construction, so as to prevent " their sinking or being destroyed by fire." " The means which " I employ for this purpose consist in so constructing the vessels " that when freighted with a cargo and passenger, the specific " gravity of the whole is less than an equal bulk of water, and so " much less in proportion as it is required to keep a larger portion " of the vessel above the surface of the water. The mode by " which I effect this is by constructing the vessels with small " cellular water-tight compartments, varying in dimensions from, " say, a cubic foot to a cubic yard, or larger, but never very large, " which cells may be arranged in the vessel when found most " convenient, and when the desired result can be produced, but " they must always be of sufficient number and capacity to float " the vessel when filled with water to the required height, and it " will be found that the number and capacity of these cells will " have to be regulated by the specific gravity of the cargo and " passengers; thus a cargo of heavy material like iron will " require a larger capacity of cellular compartment than a cargo " of sugar or of wine. The upper deck of a vessel might be com- " posed entirely of cellular compartments, and this in a passenger " vessel might be found amply sufficient to float the vessel when " filled with water to the required height. These cellular com- " partments may be made of any material, but what will probably " be found most convenient, durable, and cheap, will be iron, " which may be painted, or tinned, or galvanized, so that by " soldering each compartment may be made water-tight and " independent of its neighbouring compartments; thus if a hole " should be made in one or more compartments by cannon shot, " the vessel striking on rocks, or other accident, the water can " enter those compartments only which have sustained injury; " and should the water enter into the vessel not occupied by the " cellular compartments, it can submerge the vessel only to a " *certain depth,* the rest of the uninjured cells keeping the vessel

" afloat. To every vessel I would also attach a means of allowing " the water to enter with great rapidity, so that should the vessel " take fire the water will extinguish the fire, and can afterwards " be pumped out, and the lives of the passengers, the vessel, and " cargo saved from destruction. By this means also vessels of " war can be so constructed that it will be very difficult either to " sink, burn, or blow them up. In addition to the cellular com- " partments, and where such a construction would be inconvenient, " I would fill up every vacant space in the vessel with some " material whose specific gravity is much inferior to water, such " as cork, in fact I would use every means to reduce the specific " gravity of the vessel and its contents as much as possible con- " sistent with economy of space for cargo and convenience of " passengers."

[Printed, 4d. No Drawings.]

A.D. 1863, June 8.—N° 1423.

REYNELL, Henry.—" Improvements in the manufacture (by " the introduction of cocoa-nut husk or part thereof) of a substi- " tute for ordinary felt and kamptulicon, and in utilizing said " cocoa-nut husk or part thereof for packing of wine coolers, " refrigerators, and ice chests, and caulking of ships and vessels.' " In manufacturing (by the introduction of the cocoa-nut husk) " my substitute for ordinary felt and kamptulicon, the fibrous " substance and the powdry material resembling cork (as regards " the lightness thereof) composing the said cocoa-nut husk, I " first separate one from the other by cutting or stripping asun- " der, then tearing to pieces or otherwise removing the said powdry " material from the said fibrous substance, which I effect by the " same methods and means as those practised by the manufac- " tures of cocoa-nut fibre."

" For caulking ships and vessels this fibrous substance is used " spun or formed into threads, and in order to facilitate such " spinning I would sometimes use a portion of other fibre of long " staple, so as to strengthen such threads in the bands of the " caulker, and I can use a mixture of cocoa-nut fibre and other " fibre with suitable solutions, such, for instance, as india-rubber " in solution combined with tar liquidised by" naphtha, " although other similar liquids may be used in order to render " the same more easily and usefully applied and worked."

[Printed, 4d. No Drawings.]

A.D. 1863, June 9.—N° 1438.

M^c KILLOP, Henry Frederick.—(*Provisional protection only.*) —" Improvements in compositions for coating or covering ships' " bottoms." " In making compositions for this purpose I com- " bine together lime (by preference the lime known as Aberthaw " lime), tallow, and sulphur, by preference in the following pro- " portions:—Lime, 7 cwt.; tallow, 1½ cwt.; sulphur, ½ cwt.; and " to these I prefer to add 1 cwt. of size. This composition I do " not apply directly to the ship's bottom, but I first coat the " bottom with a composition of tar and sulphur, composed, by " preference, of 8 parts of liquid coal tar and two parts of sul- " phur. This composition is applied hot to the ship's bottom, in " the same way as when using tar only. After a ship's bottom " has been coated with this latter composition, any number of " coats of the first composition may be applied to it; and in " place of employing the latter composition for first coating a " ship's bottom before applying the first-mentioned composition " other compositions or materials or paints may be employed."

[Printed, 4*d*. No Drawings.]

A.D. 1863. June 11.—N° 1460.

HALLETT, Edwin Owen.—" Improvements in constructing " the sides of ships, batteries, and fortifications, and in applying " armour plates thereto." For these purposes in constructing the main framing, wrought iron is employed, consisting of angle or T iron. Over this framing a skin of iron plating is fixed, as has heretofore been practised; outside of the skin, teak, or oak or other suitable backing is applied, together with stringers of iron at intervals, bolted to the skin and angle irons, through which backing and stringers upright bolts are passed, which are fixed by screw nuts or otherwise. Each of the armour plates is bent by preference into a portion of a circle, so that there will be ridges and furrows formed in the structure, the concave sides of the plates being outwards. " The wood or other suitable " backing is formed into alternate ridges and furrows correspond- " ing with and so as to fit the outline or contour produced at the " backs of the bent armour plates. It is preferred that the " armour plates should be fixed in such manner that the butt " *joints formed* where the ends of the plates of one strake come

" together should come intermediate of or break joint with the " butt joints of the next strakes. The armour plates at the butt " joints, which form the ridges, are fixed together by rivets " passed in each case throngh the two armour plates near their " edges where they come together and form a ridge. The armour " plates are fixed by means of bolts passed through them, also " through the backing skin and ribs or framing, where they are " fixed by screw nuts."

By curving the armour plates in the manner described a projectile striking near the edge of the plate is caused to glance off towards the middle, and there in the strongest part of the plate, and where also it is supported by the longitudinal stringers, it expends itself.

The use of longitudinal metal stringers in the backing, between the skin and the armour plating, is said to form an important feature of the invention, and one which may be applied advantageously when flat armour plates are used. It is intended that some of the deck beams, say, every third or fourth, should protrude through the skin, and be shaped at the end to receive and support the stringer.

[Printed, 8*d*. Drawing.]

A.D. 1863, June 13.—N° 1481.

HUTCHINSON, William Nelson. — (*Provisional protection only.*)—" Improvements in means of and apparatus for cleansing " ships' bottoms and sides." The invention consists " in the " employment of what I term a traveller, that is, a case open at " top, with two sides and a bottom, to fit and travel outside and " along the keel or bottom of the ship, and of a mattress backing " or holder armed on the inside with bristles, scrapers, or pins, " connected by ropes to the traveller and in communication by " other ropes with the deck. Both traveller and cleanser are " fitted with ropes, whereby they may be drawn from stem to " stern and vice versâ. By adjusting the length of the ropes " connecting the cleanser with the traveller and the deck, the " cleanser may be made to act on every portion of the ship's " bottom and sides from the traveller upwards. I sometimes " make the mattress buoyant to assist in pressing the bristles or " pins in contact with the vessel's bottom and sides, and I prefer " to form the brushes in several parts all connected."

[Printed, 4d. No Drawings.]

A.D. 1863, June 13.—N° 1483.

ELLIOTT, THOMAS ALEXANDER.—" Improvements in the con-" struction of and in the means of ballasting ships and other " vessels." " In the ordinary mode of constructing ships, their " longitudinal strength and warping strain depends principally " on their sheeting or outer skin. My invention consists in the " employment of longitudinal ribs, sheeting, and" vertical " T-iron braces," so that the strain may be borne conjointly by them. " The sheeting forms triangles with the deck and flooring " beams and T-iron braces." " The harmony of construction " being united at the keel by the flooring beams, any required " strength may be attained by an increase in the number of ribs " and T-iron braces, or by increasing the substance."

" When this method of construction is used for a ram I apply " double sheeting," or skin, " crossing at any angle, in order to " have a sufficient depth of backing, and to prevent any warping " strain." " Tension straps " or struts from the stem " may be " applied to assist in resisting the force of concussion, the lon-" gitudinal ribs presenting a great length of surface to absorb the " concussion from shot."

" One great item of expense in the ordinary modes of ship-" building is the construction and formation of the ribs, arising " from the difficulty of obtaining curved and crooked timber, the " quantity wasted by splicing and otherwise, and the time occu-" pied, and skilled labour employed in giving each rib the required " bevel to receive each plank of the sheeting. According to my " invention the ribs are made of straight square timber through-" out, and are brought to the required curve and bevel to receive " the sheeting by being bolted to the T-iron braces; no skilled " labour is required, except for the formation and placing of the " T-iron braces. The sheeting may be one-third less than that " used in the old mode of construction, as the strain is borne " conjointly by the longitudinal ribs, sheeting, and T-iron " braces."

" My invention also consists in an improved means of ballasting " with water, and I effect this by means of two tubes, one on " either side of the keel, of any length to suit the number of " compartments to be filled; the supply for ballasting passes " through an aperture in the keel at the end of a supply tube. " *Each compartment* is furnished with a plug, which is withdrawn

" when the compartment is to be filled, and replaced when the " water is to be discharged through the tube, and pumped off in " the usual way."

[Printed, 1s. 2d. Drawings.]

A.D. 1863, June 13.—N° 1484.

MÉHU, AIMÉ.—(*Provisional protection only.*)—" An improved " helm for working the rudders of ships or vessels." The invention consists " in a mechanical contrivance for imparting motion " to the rudders of ships or vessels, by which tiller ropes or " chains, pullies, and their appendages will be dispensed with. " It is composed of very few pieces, consisting of a clasp or hoop " fitted near the top of the rudder shaft or head, from which hoop " projects horizontally a stem or bar expanding into a socket at " the end furthest from the rudder head, the said socket receiving " freely a vertical lever carried by a shaft provided with a cog " wheel, which is actuated by teeth cut on the shaft of the ordi- " nary steering wheel. The action is as follows:—On turning " the steering wheel to the right or left the teeth cut on its shaft " gear into the cog on the shaft carrying the lever, which latter " acts on the horizontal stem projecting from the hoop on the " rudder head, and the rudder obeying the impulse thus given " steers the ship."

[Printed, 4d. No Drawings.]

A.D. 1863, June 13.—N° 1489.

ROBSON, SAMUEL SINCLAIR.—" Improvements in apparatus " for working the rudders of vessels, and in auxiliary steering " apparatus." The improvements in steering apparatus relate, first, to the application of " the differential motion and power " obtained by winding up the one part of a rope or chain over a " barrel, and the unwinding of the other part from the same " barrel, but which is of a different diameter, and which I may " term a compound barrel or whelp. The nearer these parts of " the barrel approach the same diameter the slower will be the " motion and the greater the power derived. This apparatus may " be fitted to the tillers of rudders very much as used with the " ordinary chains and barrel on the steering wheel shaft, the com- " pound barrel being placed on such shaft, and the ropes or chains

" passing over pullies at the sides of the ship and thence to the " tiller. This is the simplest form, but I prefer to run the ropes " or chains fore and aft and under the steering wheel shaft. To " effect this I fix a bevil wheel on the after end of the shaft, which " gears with another bevil wheel fixed on a transverse barrel shaft" lying "near the taffrail. On this shaft I fix two compound " chain or rope barrels, and fix on the rudder head a yoke wheel " or segment, to the one end of which the ropes or chains from " the one compound barrel lead, while the other is in similar con- " nection with the other end. The bights of the ropes or chains " so led and acting on the rudder yoke simply pass round sheaves " therein. The compound barrel or barrels may be disposed on " horizontal or upright axes or in other convenient position, and " the ropes or chains lead over suitable turning blocks, pullies, " or sheaves, or may be otherwise conducted to act on the rudder " head as desired.

"The motion of the steering wheel shaft may be communicated " to the barrel shaft by an endless pitch chain spur gear, or " otherwise to suit the convenience of position desired to be " occupied. Instead of ropes or simple chains fastened to the " barrel or barrels at the ends, chains and chain sheaves or wheels " may be used which will prevent slip; or a sufficient number of " turns of the chain may always be on the barrels to give the " hold required. By this apparatus the rudder is held in any " position in which it may be placed, and relieves the arms of the " steersman from all strain in holding the rudder stationary.

"The second part of the invention which relates to auxiliary " rudders consists in the application of a cross shaft or shafts " through the dead wood, or otherwise near the stern post, or in " the run of the ship; this shaft projects considerably at each " side of the ship, and is suitably stayed at each end to hold it " firm, in which stays and its central bearing it is free to turn. " On this shaft I place on each side of the ship one or more " surfaces somewhat like screw propeller blades, but which are " simply flat plates set at an angle on the shaft. If two plates " are placed on one side of the ship they are placed parallel to each " other; when these blades are in a vertical position they simply " cut the water, but when the shaft is turned a quarter revolu- " tion, which is effected by an endless screw and wheel or other " suitable gearing from the deck or interior of the ship, the plates " *will be inclined to* the motion of the ship and will turn and

" steer her as a rudder, and in proportion to the surface presented " with greater or less efficiency. It may be desirable in some " cases to have two shafts, one to project on one side of the ship " and the other on the other side, and so permit of working them " separately."

[Printed, 1s. 2d. Drawings.]

A.D. 1863, June 20.—N° 1550.

PETERSON, Charles.—" A new material or compound " applicable to the manufacture of pipes or tubes, to caulking or " covering ships' bottoms, and to other useful purposes." This invention consists in " the manufacture of a new material or " compound applicable to the formation of pipes or tubes for " the conveyance of water and sewage or any other liquid or " fluid, also for telegraphic wires, and for roofing, paving, caulk- " ing, sheathing, or covering ships' bottoms, for a substitute for " papier maché, for carriage panels, and a variety of other useful " purposes.

" I take any vegetable fibre or substance suitable for the pur- " pose, and boil the same in a solution of caustic alkali for about " twelve hours, after which it is rendered into a pulp by any " convenient means. I also take a quantity of tar, pitch, or other " bituminous substance, mineral or vegetable, separately or " together, according to the article to be produced, and boil with " about one-fourth the weight, more or less, of caustic alkali, " until it is completely saponified; it is then, whilst hot, mixed " with about an equal weight of fibre (more or less), rendered " into pulp, for about an hour. I then add to the mixture about " two per cent., more or less, of alum or sulphuric acid, or both " combined, or any other suitable powerful chemical decomposing " agent. I then take the mixture or substance so produced, and " form it by any convenient method into sheets, slabs, pipes, tubes, " blocks, or other shape suitable for any of the purposes before " mentioned."

[Printed, 4d. No Drawings.]

A.D. 1863, June 20.—N° 1555.

WINANS, William Louis, and WINANS, Thomas.—" Im- " provement in the construction of steam vessels." The invention consists in certain improvements upon an invention for which

Letters Patent were granted 19th June 1858, No. 1386, to Ross Winans and Thomas Winans, for "a new and useful improve-" ment in the form of the hulls of steam vessels," namely, in making a flat or nearly flat deck surrounded by enclosed bulwarks or open railing, or with an enclosed cabin or cabins upon it, with upper or hurricane deck on the upper part of the spindle-shaped hull of the vessel, described and shown in the Specification and Drawings of Ross and Thomas Winans' Patent above referred to. The connection between the bulwarks or enclosed cabin or cabins, and the spindle-shaped hull of the vessel is made sufficiently high above the water line, or line of floatation, to be out of reach of ordinary waves in ordinary sea weather.

[Printed, 8d. Drawing.]

A.D. 1863, June 20.—N° 1557.

WINANS, WILLIAM LOUIS, and WINANS, THOMAS.—"Im-" provements in adapting propellers for propelling ships or vessels " for ocean navigation." The invention consists in "the adapta-" tion to and combination with a spindle-shaped hull, such as " was invented by Ross and Thomas Winans, and patented 19th " June 1858, No. 1386, of a screw propeller placed at one end of " the vessel, or two screw propellers, one placed at each end of " the vessel. It likewise consists in the adaptation and combina-" tion of like propellers to a spindle-shaped hull in combination " with a flat or nearly flat upper deck, with bulwarks, railing, or " cabin similar to that invented by us, and for which we have " applied for Letters Patent. The longitudinal centre line of " the shafts of these propellers coincides, or nearly so, with the " centre line or longitudinal axis of the vessel, so that one-half, " or nearly one-half, of the propeller or propellers will be out of " the water. The external surface of one end of the hub of the " propeller corresponds with the outside diameter of the end of " the hull of the vessel, and the other end of the hub is continued " to a point, thereby completing the spindle form of the vessel."

"When one propeller is used, we would prefer, for greater facility " of steering, that it should be placed on the forward end of the " vessel with one of the rudders of large size a short distance in " rear of the propeller, in order to partially counteract the ten-" dency of the end of the vessel to move laterally by the action " of the propeller."

" We propose, in some cases, to employ one or more fins pro-
" jecting down from the hull a short distance astern of the wheel, " so as to counteract partially the tendency of the end of the " vessel to be pressed laterally by the action of the propeller."

[Printed, 1s. 10d. Drawings.]

A.D. 1863, June 20.—N° 1558.

WINANS, William Louis, and WINANS, Thomas.—" Improvements in adapting propellers for propelling ships or vessels " for ocean navigation." The invention consists in " a combination of two screw propellers, one at each end of a ship or vessel " of the ordinary form or type of hull. Each propeller is to be of " larger size than the screw or stern propellers heretofore in " general use for similar sized vessels for ocean navigation. A " portion of the propellers will therefore project above the surface " of the water when the vessel is fully loaded."

" As a modification of the above, the vessel (to which the two " propellers are to be adapted, one at each end, as already " explained) may be so constructed at the ends that the forward " and after lines of the vessel below the water line will be made " to conform to or blend with the hubs of the propellers, which " hubs for this purpose are enlarged."

By this invention, " more propelling surface and a more " uniform extent of immersion of propeller is obtained, and a " greater pitch of propeller can be employed than has hitherto " been used in vessels with screw propellers as heretofore con- " structed for ocean navigation. The machinery for driving the " propellers is to be placed between them. In some cases both " propellers may be mounted upon the same shaft, and the " engines may thus be made to actuate both propellers simul- " taneously. In other cases the propellers may be mounted on " separate shafts and actuated by separate engines, so that the " propellers may be used singly or be driven either in the same " or in opposite directions."

[Printed, 10d. Drawing.]

A.D. 1863, June 22.—N° 1570.

WINANS, William Louis, and WINANS, Thomas.—" Im- " *provements in adapting* propellers for propelling ships or

"vessels." The invention relates to certain improvements upon an invention for which Letters Patent were granted 19th June 1858, No. 1387, to Ross and Thomas Winans. The invention therein patented is described as consisting in "the combination "of a hull, which may be represented by the two ends of a "spindle divided transversely near the middle or centre of its "length, with only one vertical propeller, occupying a space "between the two portions of the spindle, which are secured "together by a suitable framing or sleeve attached to their "adjacent ends, and extending over the propeller, thus combining "the two ends, and completing the spindle-shaped hull of the "vessel, the hub of the propeller being equal to the diameter of "the hull of the vessel at the part where the two ends of the "spindle were joined together and the propeller only about half "immersed."

The present improvement upon the invention aforesaid, consists in "the adaptation of two screw propellers, in combination "with the spindle-shaped hull, constructed in three parts. The "spindle-shaped hull of the vessel, constructed according to the "present invention in combination with two screw propellers, is "formed of three separate and distinct water-tight vessels or "parts of which the centre or middle part is much the largest. "The two smaller end parts of the spindle are united to the "larger central part of the spindle by framing, which are wholly "or partly above the centre or water line of vessel. The pro-"pellers are placed one at either end of the central vessel or com-"partment, and occupy a space between the smaller end parts "and the larger central part of the vessel. About one-half of "the propellers only is immersed, and they are constructed "similar to and operate like the one propeller shown in the "Specification of the Patent" "above referred to. By this "means a greater amount of propelling surface of blades or an "equal amount of propelling surface can be obtained with less "draft of water than by a single propeller, as" "above "mentioned."

The invention likewise consists in "the combination of two "propellers as herein-described, with a spindle-shaped hull, as "improved by ourselves, and for which improvements we have "obtained Letters Patent. The engines for propelling the wheels "or propellers we place in the central compartment or vessel, "between the propellers. In some cases the propellers are placed

" upon one shaft, common to both, and actuated by the same " engines, simultaneously; in other cases the propellers are " placed upon separate shafts, and are actuated by separate " engines, so that the propellers may be driven in the same direction " or in different directions. By this means the vessel could be " turned upon its centre by causing the propellers to rotate in " opposite directions, and one or both propellers may be used as " required."

[Printed, 1s. 2d. Drawings.]

A.D. 1863, June 22.—N° 1571.

WINANS, WILLIAM LOUIS, and WINANS, THOMAS.—" Improvements in adapting propellers for propelling ocean steam " vessels." The invention relates to certain improvements upon an invention for which Letters Patent were granted 19th June 1858, No. 1388, to Ross and Thomas Winans. The invention therein-described was a combination of a vertical transverse trunk within the hull of a vessel of ordinary form, or such form slightly modified, with a screw propeller of large size, or two screw propellers placed side by side, whose blades project beyond the outside of the hull. The present invention consists in the combination, for ocean steamers of the ordinary type of hull, of two vertical transverse trunks, one placed towards each end of the vessel, with two screw propellers, one placed in each trunk, of such large size that the blades shall project above the surface of the water when the vessel is fully loaded.

As a modification of the above arrangement, two propellers may be combined with vessels, the hulls of which are so modified towards the ends as to conform more nearly in form to the hub of the propellers under and for a convenient distance above the water line. The machinery or engine for driving the propellers is to be placed between them. In some cases both propellers may be mounted upon the same shaft, and the engines may be made to actuate both propellers simultaneously. In other cases the propellers may be mounted on separate shafts, and actuated by separate engines, so that the propellers may be used singly, or be driven either in the same or in opposite directions.

[Printed, 10d Drawing.]

A.D. 1863, July 1.—N° 1637.

COLES, Cowper Phipps. — "An improved method of and "apparatus for working guns in vessels and forts, and discharg- "ing them under water." "My improved method of working "guns in vessels and forts, and of discharging them under "water, consists in placing an apparatus composed of a circular "frame or wheel free to revolve on its axis in a case or compart- "ment shut off from the rest of the vessel or fort, but with "access from the deck or floor to part of the frame revolving in "the case above the water line for the purpose of loading one of "two, three, or more guns, which are supported upon blocks or "carriages on opposite sides of the frame, and are capable of "being protruded from the frame, and through an aperture in "the side of the water case, and side of the vessel or fort for the "purpose" of "being discharged under water. Water has free "egress in and around the apparatus, but when the guns are not "required to be used, the water may be kept out by an ordinary "port valve or shutter."

In working the apparatus one gun is under water, and the opposite gun above the water line, and in a position for being loaded and primed from the deck inboard, or from the floor of the fort. After being loaded, a parchment or other suitable cap is placed over the muzzle of the gun, to prevent the water entering before the gun is discharged. "I prefer to effect the discharge by "electricity or galvanism in the manner well known. After the "discharge the recoil drives the gun inwards in the apparatus "and causes the frame to rotate and partially to bring the gun "which had been loaded into position for being fired." The gun is prevented from running out again by a chain, windlass, and pawl. The exact position of the frame for loading one and discharging the other gun is obtained by means of a toothed pinion.

[Printed, 1s. 8d. Drawings.]

A.D. 1863, July 2.—N° 1650.

RANSOME, Frederick.—"Improvements in coating or pre- "serving iron ships or vessels or iron used for other purposes." This invention consists "in the employment of a soluble silicate "mixed with other substances which will convert the soluble

" silicate into an insoluble one, and thus form a coating upon the " surface of the iron for the purpose of protecting the same from " oxidation, or for the purpose of preventing radiation of heat, " or for the purpose of otherwise protecting or preserving the " same. In some cases, where it may be desirable to form merely " a thin coating for merely preserving the iron, or as a substitute " for paint, I first apply a soluble silicate of soda or potash, or " a soluble soda or potash silicate of some earth or metal (as " nearly neutral as possible), with or without the mixture of " coloring or other matter (which can be done with a brush), and " after the same has been done a sufficient length of time to allow " a slight amount of evaporation to take place at ordinary tem- " perature, I wash the surface over with a solution of chloride of " calcium or other suitable decomposing agent, at about the same " temperature as the surrounding atmosphere, and as soon as " convenient afterwards, when the soluble silicate has become " partially decomposed, I again wash over the surface with or " immerse the iron thus coated, where more convenient, in a " solution of chloride of calcium or other suitable decomposing " agent at a boiling temperature, or as near thereto as possible, " by means of which the soluble silicate becomes converted into " an insoluble silicate."

"Where it is desired to produce a thicker coating or substance " upon the iron, either for preventing radiation of heat or other- " wise, or as a silicious paint for covering or preserving iron, I " sometimes mix powdered chalk, powdered dry white carbonate " of lead, with a solution of a soluble silicate of soda or potash, " or a soluble silicate of some earth or metal, with or without " coloring or other matter, to the consistence of ordinary paint," " which I afterwards apply " " by a brush or in any other con- " venient manner, and after allowing it to remain a sufficient " time to become partially set or dry, I wash the surface over " with or immerse the iron, &c. in a solution of chloride of " calcium or other suitable decomposing agent in the manner " before described. The proportions of powdered chalk, " powdered dry white carbonate of lead, as also of the coloring " and other matter may be varied at pleasure;" "but for ordi- " nary purposes I find that the following proportions are appli- " cable :— 1 lb. of dry white carbonate of lead, 4 lbs. of dry " powdered chalk or carbonate of lime, 1½ pints of solution of " silicate *of soda, specific* gravity 1·450."

"Where a still thicker coating is desired than can conveniently "be applied in the form of a paint or by means of a brush, I "mix a soluble silicate of soda or potash, or a soluble soda or "potash silicate of some earth or metal, with sand, powdered "chalk, powdered glass, or other suitable mineral or earthy sub-"stance, and apply the same with a trowel or with pressing sticks "or rammers until the surface is coated to the thickness required, "and afterwards wash the mixture or saturate it with a solution "of chloride of calcium or other suitable decomposing agent in "the manner before described. The several ingredients, as well "as the proportions thereof, may be varied," "but I find the "following will produce a good hard stone covering, viz.:—1 "bushel clean dry sand, ¾ peck finely powdered chalk, 1 gallon "of solution of silicate of soda, specific gravity, 1·750." "Before "applying the last-mentioned mixture, I prefer to prepare the "iron by coating the surface to be covered with a plain solution "of soluble silicate of soda or potash, &c., of a specific gravity "of 1·600 or thereabouts; or in some cases, where desirable, I "mix and incorporate with a soluble silicate, sand, powdered "chalk, powdered glass, or other suitable mineral or earthy "substance, some decomposing agent in the state of powder, as, "for instance, carbonate or oxide of lead, or carbonate or oxide "of zinc, or alumina, which, by combining with or by decompo-"sing the soluble silicate, will produce an insoluble silicate. The "proportions of such decomposing agents will vary according "to the result desired to be effected and the rapidity with which "the materials are required to set or become hard."

[Printed, 4*d*. No Drawings.]

A.D. 1863, July 9.—N° 1709.

BROOMAN, RICHARD ARCHIBALD.—(*A communication from Auguste Salzmann.*)—"Improvements in ships, and in propelling "the same." This invention consists in "constructing the hull "of an elongated narrow form, and in connecting to the bottom "thereof a cylindro-conical tube; the communication between "the two is effected by three vertical cylinders. The tube is "divided into three water-tight compartments; the two end "compartments are left empty. The central compartment may "at pleasure be made to contain compressed air or water, whereby "the line of floatation may be regulated. To diminish the

"friction of the three cylinders uniting the tubular keel and hull, "I enclose them in a casing. At the sides of the hull there are, "say, six supporting and propelling cylinders or drums divided "into water-tight compartments, which, together with the tubular "keel, maintain the ship at one level, and the drums keep it in "equilibrium. The circumference of the drums is not a plain "surface, but consists of two inclined planes meeting in the "centre, and sloping from the centre to each side. Floats are "attached by rods or bars to and parallel with the circumference "of the drums, but at a distance from it equal to about the "breadth of the floats; the object of the space between the drums "and the floats is to allow of the water running off instead of "being carried round by the floats, as would be the case if the "floats were attached directly to the drums. Each of the drums "is, by preference, driven by a separate engine, in order that all "or any of them may be worked as required."

[Printed, 8*d*. Drawing.]

A.D. 1863, July 11.—N° 1734.

RUTHVEN, Morris West.—"Improvements in rudders or "apparatus for steering vessels." The invention relates to "a "peculiar construction and arrangement of rudder whereby, on "the usual movements being imparted to it by the ordinary or "other steering apparatus, it will present an approximately "curved surface or a surface composed of a number of planes at "increasing angles to the keel of the vessel."

"According to one mode of carrying out this invention, the "rudder is composed of three or more moveable parts like so "many separate rudders hinged to each other. In order to cause "these separate hinged parts to form an approximate curve, "when the rudder is put over to 'starboard' or 'port,' a lever "is attached to each part and has a pin or slot in one end "which works in a slotted piece or pin secured to the preceding "part, and this arrangement is carried out and repeated through "the entire series, the lever of the second part working in a "slotted piece or pin secured to the sternpost itself. In place of "the pin or slot of each lever working in a slot or pin in the "adjoining part all the pins or slots of the several levers may "be made to work in one and the same piece secured to the "sternpost, which piece is provided with slots or pins as the case "may be."

[Printed, 10d. Drawing.]

A.D. 1863, July 13.—N° 1746.

WALKER, Robert Stocks.—(*Provisional protection only.*)— "Improvements in sheathing or coating iron ships." The invention relates "to the coating or sheathing of iron ships with "Portland or other analogous and suitable cement, which I apply "in the ordinary manner of applying such cements, and of a "suitable thickness for the purpose required. I then coat the "surface of the cement with a solution of copper for the pro- "tection of the cement and to prevent the incrustation of barnacles "or collection of other matters thereon. Instead of the copper "being applied in solution it may be applied in sheets, suitable "provision being made for attaching it. For this purpose metal "ribs may project through the cement in order to secure a wood "sheathing on the exterior of the cement, on which wood "sheathing the copper sheets may be fixed as usual, or strips of "wood may be imbedded in the cement, in which they will be "held, and to which wood strips the sheet copper may be secured, "or copper sheets may be otherwise attached, the principal "feature being the application of a thickness of cement on the "exterior of the iron ship to prevent galvanic action being "generated in the copper and iron."

[Printed, 4*d*. No Drawings.]

A.D. 1863, July 16.—N° 1781.

TAYLER, Joseph Needham, and AUSTIN, William. — "Improvements in the construction of ships and other floating "bodies." The objects of this invention are to facilitate the steering and rapid turning or revolving of ships and other floating bodies; to prevent them from violent rolling or lurching; to protect the sides, decks, propellers, machinery and other parts thereof from the effects of shot and otherwise; and to increase the strength of such structures.

It consists, first, in constructing ships and other floating bodies with one, two, or more, (by preference two) waterways or channels, running from stem to stern at or under the bottom, in which waterways or channels screw or other propellers are fitted.

2. In the employment of two pairs of propellers at or under the bottom, one pair forward and the other pair aft, and arranged so that each propeller may be worked separately or in conjunction with all or any of the other propellers, and in either direction. The propellers are fitted in such manner that they

may be taken out when required for repairs or otherwise. These propellers are intended to be driven collectively for forward and backward motion; but if the vessel is to be turned round, then opposite propellers are driven in opposite directions. The rudder can be turned sufficiently to close the end of either of the channels.

3. In constructing ships or vessels with a flat bottom, or somewhat concave transversely, from stem to stern,

4. In attaching to the stem or stern post "a dovetailed vertical "supporting grooved chamber or casing of iron," into which a sliding dovetailed gudgeon piece is fitted, to which iron eyes or gudgeons are fixed to receive the hook, pintles, or iron gudgeons geared upon the rudder; and in constructing rudders with grooved and tongued or side rebated pieces sliding or fitting into each other, and fastened by bolts of iron horizontally or crosswise.

5. In forming ships and other floating bodies or vessels "with "curved or arched peaks," or triangular ends, as rams, and protecting the same internally with iron casing plates, and externally with iron armour plates.

6. In placing vertical and longitudinal iron ribs or plates over the gun deck, about 6 inches thick, 3 inches broad, and 4 inches apart, more or less, with flanges, well rammed or filled in with sand, or end-grain wood panels, or other suitable materials, resting on "1 or 2 inch iron plate or deck beams, the ribs or plates "being rounded or curved in their lengths like a bridge, and "sloping off at ends to the gunwales, so as to throw a shell or "shot overboard."

7. "In the employment of port guards, of iron or steel, "made to close, when required, like a dock gate, and presenting, "when closed, an angle outside, and being open above and below "with iron gratings or bars for free circulation of air; the run- "ning out of a gun opens the port guards to any extent required, "and the recoil of the gun again closes the guards to the angle "of protection whilst loading."

8. "In constructing vessels with sides and ends projecting "outwards in an angular or curved form, and covering the sides "and ends of ships, vessels, or floating bodies with an increased "thickness of iron armour plating, such plating being backed "with end-grain timber, or with sand or pig-iron, or any other "resistant material."

9. "In building all the timber frames of ships' carcases and "decks close up together with tight packed jointings, and bolting "through the timbers with phosphorized copper bolts; ships "constructed in this manner will hold together much longer, "and would not easily break up if wrecked."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1863, July 16.—Nº 1791.

THOMPSON, Nathan.—"Improvements in boat-building and "in machinery for shaping wood therefor." This invention consists, first, "of an improved form or mould, which in the "Specification of a former Patent, dated the 13th of September "1860, No. 2209, was designated an 'assembling form;' it was "composed of a series of bars of rectangular section sawn to "form; these bars were arranged longitudinally of the frame, "and suitably notched out to receive and have the ribs accurately "fitted to them."

"Now according to the present invention I employ round "longitudinal bars bent to form, and the notches and bevils "formed thereon (in lieu of the square bars described in the "former Specification) with the round longitudinal bars set on "supports carried by strong transverse frames suitably blocked "up and fixed; these supports are bolted to the frames and the "bolts passing through slotted openings in the transverse frames, "and through slotted openings in the stems of the supports "readily admit of adjustment. The round longitudinal bars of "the 'assembling form' are first steamed, and then bent upon "proper lines marked upon a flooring or other suitable "even surface, chocks being fixed thereto to retain them until "cooled and set. The transverse frames which carry the adjust- "able supports are preferred to be of cast iron. The bow or "most forward of such frames instead of carrying supports as "above mentioned, is provided on each side with eyes, and bolts "are passed through the forward ends of the longitudinal bars; "these bolts have forked heads, and are to embrace the eyes on "the bow frames, to which they are then secured by pins passing "both through the forked heads of the bolt and the eyes.

"The longitudinal round bars having been each separately "secured at their forward ends, as above stated, to the bow "frame, are bent down to their supports on the transverse frames

" until arriving at the last or stern frame, where they are firmly " held, the round longitudinal bars at that end having holes for " bolts to pass through and recesses for nuts to enter, and the " bolts are made with hooked ends which catch into slots in the " stern frame.

" After having placed correctly all the round longitudinal bars " on their supports and fixed them securely, and having also set " up the keel and the stem and stern post in their proper places, " and fixed them to other supports on the transverse frames " which are provided to carry them, the next thing to be done " is to set out and mark the distances for the ribs upon the keel " as well as upon the 'gunwale seat,' which is a piece passing all " round the frame where the gunwale of the boat comes. Then " the gunwale is fixed on its seat, and the strips of wood to form " the ribs or frame of the boat are each fixed to the under side of " the keel in their proper places, and they are successively bent " down over the round longitudinal bars and made fast to the " gunwale." "This mode of forming the frame by bending " down the strips of wood to form the ribs over the round longi- " tudinal bars may be carried on readily until arriving at the " parts near to the stem and stern, where the ribs assume a " a double curve or S form, such parts must then, where requisite " by the change of curve, be clamped on to the longitudinal " round bars, or, if preferred, such stem and stern ribs may be " sawn out instead of being bent into form. The ribs having " thus been correctly placed are ready to receive the planking or " skin. In constructing assembling forms for very large boats it " will be difficult to bend the longitudinal round bars sufficiently; " in this case I sometimes cut them roughly to form, and then " bend them, if necessary, on their supports exactly to the shape " required."

Certain improvements are also described in machinery for " rabbetting the keels of boats together with the stem and stern " posts;" for sawing wood suitable for boat-building; and for shaping and bevilling the edges of planks.

[Printed, 5s. 10d. Drawings.]

A.D. 1863, July 17.—N° 1799.

BROOMAN, Richard Archibald.—(*A communication from Messrs. Chaumont and Company.*)—(*Provisional protection only.*) —" An improved *varnish* for preserving metal and wood."

This invention consists in forming "a varnish composed of a "base and a solvent, as hereafter explained. The base is bitumen, tar, galipot, colophany, dry pitch, or other resinous "matter; and the solvent sulphuret of carbon. According to "the quality of the bituminous matter the varnish may be formed "of 100 parts bitumen, and from 100 to 80 parts sulphuret of "carbon. If tar be used as the base, then for 300 parts of tar "add 100 parts of sulphuret of carbon. The varnish is made "cold, and in manner following:—Pour or place the bitumenous "or resinous matter into a suitable vessel, pour over it the "sulphuret of carbon, and close the vessel hermetically to pre-"vent the sulphuret evaporating. In from 12 to 24 hours the "dissolving action of the sulphuret will have formed the solution, "the vessel may be opened and the varnish will be found in a "semi-liquid state. It is applied by spreading in one or more "coats on the metal or wood to be preserved. The varnish will "be found particularly suitable for all marine purposes, as its "exposure to water has the effect of hardening it, but whereso-"ever applied on wood or metal its preservative effects will be "found highly efficient."

[Printed, 4d. No Drawings.]

A.D. 1863, July 23.—N° 1843.

SOUL, MATTHEW AUGUSTUS.—(*A communication from John Palmer.*)—" Improvements in expelling solid and liquid refuse "matter from steam and sailing ships below the water line, "applicable also for discharging cannon below water from ships "and forts, and in part for charging gas retorts and iron fur-"naces, and for other similar useful purposes." The principle, the application of which in various forms constitutes the invention, consists in the depositing any material or matter to be disposed of under unequal pressure of water, air, gas, or other agents, into a barrel or receptacle, which barrel or receptacle, by means of the mechanism described, can be put alternately into operation by means of the aforesaid unequal pressure, so that communication with the greater pressure being cut off, the matter can be placed under the ordinary lower pressure in the receptacle or barrel, which, upon being hermetically closed by a lid or cover, is put into communication with the greater pressure by opening a valve, sluice, or other partition, whereupon the aforesaid matter is ejected, or falls into the fluid or gas of greater

pressure by means of pneumatic or any other elastic fluid pressure externally applied.

The first of the improvements has for its object the getting rid of the ashes, clinkers, and other refuse of the furnaces of a steam ship, without the necessity of hoisting them out of the stoke hole, and consists in attaching to any convenient part of the ship's hold, in the vicinity of the furnace, and sufficiently below the water line, a water-tight receptacle, provided with two suitable covers or any number of valves, one of them opening towards or within the stoke hole, for the reception of the substances required to be got rid of, and another or external valve is for the purpose of opening the external communication, through which the matters to be ejected are passed out of the ship. At the same time the aforesaid receptacle is to be supplied with suitable pressure, as, for example, air forced in by means of a pneumatic pump worked by the steam engine or otherwise, which air or other pressure depresses the water and allows the substances deposited within the receptacle to fall by their own weight into the sea, so soon as the external valve is opened. Thus by opening and shutting the valves alternately, and the intervention of the air or other pressure at proper times between the valves, the expulsion of the contents of the said submarine receptacle or apparatus may be easily and safely effected.

Secondly, the invention consists in the application of the aforesaid submarine receptacle or apparatus to the discharging of the contents of sinks and waterclosets, when such sinks and waterclosets are fixed below the water level in any part of the ship. In this case, in addition to the pneumatic pump, a packing is used in the top cover and bottom edges of the receptacle, by which the accidental leakage of any offensive effluvia within the ship will be totally prevented.

Thirdly, in the adaptation of the aforesaid or similar submarine or submerged apparatus, acting on the same principle, for the purpose of firing ordnance below the water level. In this case, besides the submarine receptacle already described, "I use "a smaller receptacle, tube, or gun case, in which the gun to be "fired is to be placed together with a rod to be worked through "a stuffing-box in the cover of the case by which the gun can "be pushed forward towards the port hole, and, when necessary, "may be returned again by the same means. The interior of "the gun case is *made* very little larger in diameter than the

" breech of the gun, and the small space about the breech of the " gun causes it to cushion upon the water."

Fourthly, in the application of the aforesaid invention to the firing of ordnance in a submarine fort.

Fifthly, in the application of the same valvular arrangement and apparatus to the charging of gas retorts and iron furnaces on land.

[Printed, 1s. Drawings.]

A.D. 1863, July 27.—N° 1864.

THORNE, THOMAS. — " Improved apparatus for disengaging " ships' boats." This invention is intended to facilitate " the " instant disengaging of a ship's boat from the ' davit-tackle- " falls ' (when lowered into the water) in such a manner that both " ends of the boat are disengaged simultaneously by the single " action of one lever. To the keel of the boat two sockets are " firmly bolted, and into these sockets are passed the lower ends " of two suspending rods, the ends being formed with long slots, " and the sockets provided with bolts passing through the slots " in such a manner as to allow of the suspending rods having a " certain amount of vertical motion in the sockets, but not of " their being withdrawn entirely. At the upper end of each sus- " pending rod is a slip bolt or pin, secured by a lever clamp, " which is kept closed by passing through a slot in the thwart, " or by a guard link attached by a rod to the socket, and sliding " on the suspending rod. The boat is supported by passing two " hooks attached to two blocks (running in the bight of the " ' davit-tackle-falls ') under the slip bolts or pins at the upper " ends of the two suspending rods. The stem and stern of the " boat may be further supported by means of links or rods con- " necting them respectively to the suspending rods. When the " boat is hanging at the davits the suspending rods are held fast " in the sockets by means of two locking bolts, both connected " to one rod, the end of which is attached to a lever in the stern " or other convenient part of the boat. When the boat is lowered " into the water, upon pulling this lever both bolts are simul- " taneously withdrawn, when the suspending rods slide in the " sockets just sufficiently to draw the projecting ends of the lever " clamps through the slots or the guard links, thus releasing the

" slip bolts or pins, and instantaneously disengaging the boat " from the falls at both ends."

[Printed, 8*d*. Drawings.]

A.D. 1863, August 5.—N° 1929.

CLARK, GEORGE.—" Improvements in the construction and " protection of ships, vessels, and floating batteries, and in the " preparation and arrangement of materials for those purposes, " some of such improvements being applicable to the construc- " tion and protection of land fortifications." This invention consists in the following improvements in the construction and protection of ships and floating or land batteries, and in preparing and arranging materials used to carry out such improvements :—

1. A combination of thin metallic and fibrous plates, presenting their edges to resist projectiles, and constituting either outer armour or backing to armour plates. " Iron plates may be used, " but I prefer steel, believing this mode of applying the latter " material as armour to ships or batteries advantageous in point " of economy and efficiency. The fibrous plates may be com- " posed of millboard, papier maché, or any kind of fibrous " material, combined with other substances calculated to produce " hard and tough plates, which are to be of uniform thickness " and should be fire and waterproof."

2. The arrangement of plates and bars diagonally from the sides and ends of the vessel, towards the centre, along the plane of the decks, and above and below them, converging to a peak at the stem and stern, the object of this improvement being to impart greater rigidity to the entire structure, and to distribute a shock at any part of a vessel over the entire hull.

3. The construction of the armoured top sides of iron-clad ships above the water line several feet inboard, so as to bring the weight of the battery or fighting deck, with its armament, towards the centre, and relieve the sides of the ship, leaving a gangway deck outside such armoured sides, and effectually protecting the guns and crew. This plan also affords the means of lighting and ventilating the gun and main decks, through openings in the gangway decks between the ports, and in the casemated roof of the battery.

4. The protecting of a ship from the effects of projectiles at or near to the *water line by* the construction of an inner line of

armour, with a free gangway space between such inner armour and the sides of the ship. A passage, which may be divided by bulkheads, is carried round the ship between the sides of the ship and the inner line of armour. The floor of this passage is made water-tight, and close along the sides of the ship iron bunkers are formed in lengths of 10 to 20 feet or less, of which the tops are about 2 to 3 feet above the water line. In the event of a shot penetrating through the outer armour and the bunker plates, its force will be so much diminished that probably it will be brought to by the inner armour. The men could easily get at the holes in the side of the ship or the bunker, and stop the flow of water through the holes.

5. The sheathing of iron ships or iron-clad ships with copper, without exposing the iron skin or the armour plates to chemical action from the copper sheathing, and at the same time protecting the bottom of the ship with armour plates under the water line. To effect this object planks are fastened outside the armour plates by means of bolts, which pass through the plates or between their joints; a coating of cement, concrete, or asphalte, or some similar substance impervious to water, covering the outside of the armour plates an inch or two, more or less, in thickness, and forming a bed between them and the planks. The copper sheathing is then fastened on the planks.

6. The improvement in constructing and strengthening wooden ships, which is carried out in the following manner :—" Wooden " timbers or ribs about 12 or 15 inches square, or 12 by 15 inches " section, more or less, are placed vertically and fastened and " secured in any manner practised in ship building, leaving " intervals of 12 inches, more or less, between the timbers so " placed. To one or both sides of every timber, or every other " timber, iron angle bars about 3 by 3 or 6 by 6 inches, and " ½ to ¾ of an inch thick, according to the size of the vessel, are " fastened with rivetted or screw bolts, one side or flange of " each angle bar parallel to the sides of the timbers, the other " side or flange on a line and let in flush with the outside of the " timbers, projecting laterally and in a vertical direction from " the latter. To these projecting flanges other angle or Z-shaped " iron bars are rivetted or bolted horizontally or diagonally, with " intervals of 18 to 24 inches, more or less, between them. In " the spaces of these last-named intervals the planks of the ship " *are placed* and bolted to the timbers and caulked in the ordinary

"way; or in lieu of horizontal angle or Z-iron bars being "rivetted or bolted to the timber angle bars, the planks may be "fastened to the timbers with thin plates of iron fitted between the "planks with their edges bearing on the timbers. The intervals "or spaces between the timbers are then filled in solid with "baulks of wood, which become additional ribs or timbers, to "which also the planks are bolted. A solid structure of great "strength is thus formed, combining the ordinary structure of a "wooden ship strengthened with iron bars in a way which has "not hitherto been practised."

"In order to protect the wood of the timbers and the planks "from the corrosive action of iron employed in this or any other "naval structure, and also to protect iron in such structures from "the galvanic action of copper, I cover the iron angle bars or "plates and bolts, used in any such structure with a coating of "enamel by a process similar to that employed to enamel the "inside of iron culinary vessels, and when I wish to prevent the "corrosive action of any salts or acids on the material, whether "of wood or iron, forming any part of the structure of a ship, I "interpose on the outer surface of the planking of a wooden or "the skin of an iron ship or of the backing of armour plates, a "layer of Roman or Portland cement, or other cement of an' analogous "character, between such outer surface and the materials "with which it is covered."

7. "The formation of iron cellular backing to armou plates in "compartments of limited area, by confining metallic plates and "the filling between them, to each compartment, and compress- "ing the materials therein separately."

8. "The construction, formation, and attachment to ships or "forts of masses of iron cells as a part of a system of protective "armour, by manufacturing such masses separately, and then "fitting and fixing them to the surface they are intended to "cover." "The series of cells being fastened, as described, to "the ship or battery, the cells are filled with blocks or planks of "wood or compressed fibrous material rendered water and fire "proof, and exceedingly tough and resistant to penetration. "This plan of constructing cells in masses or sections facilitates "the fixing of a second or third series of cells superposed on "iron cells fastened outside a ship on the plan of my invention "for 'Improvements in the Application and Manufacture of Iron

" 'or Steel as Armour for Ships or Batteries,' for which I obtained " Letters Patent, No. 3068, dated the 7th December 1861."

9. " The conversion into steel of iron plates and bars manu-" factured for the construction and protection of ships after they " have been so manufactured."

10. The construction of bolts, and the perforation of armour plates, for the purpose of fastening the latter by inserting the bolts at the back of the plates. These bolts may be from 2 to 3 inches in diameter, with a conical head about 2 to $2\frac{1}{2}$ inches in length. One-fourth part of this head on each of two opposite sides is cut away to the diameter of the shaft. For the insertion of this bolt from the inside, a conical hole in which to fit the bolt head is drilled into the back of the armour plate about $\frac{1}{4}$ of an inch more in depth than the length of the conical head of the bolt. One-fourth part, or a little more of the circle of the metal of the plate round this hole, is cut away from the back of the plate, being thus enlarged outwards to the diameter of the conical head. By this arrangement the remaining portion of the head, part of which has been cut away, as before described, may be passed into the hole in the armour plate, and when pushed home to the top of the hole the bolt may be turned round, and by giving it a quarter turn, the half of the conical head will clip the shoulders left in the hole, and the bolt will draw. " In order to give greater strength " to the bolt, and make it less liable to break, I make the end " $\frac{1}{2}$ an inch or an inch larger in diameter than the shaft. This " bolt will thus be fitted and fastened to the plate and may be " removed from behind, the perforation of holes through the " armour plates being avoided. The bolt head will be protected " from impact by the thickness of the plate over it, and the space " left in the hole above the head will tend to relieve the bolt " from the shock of projectiles striking the armour plates."

[Printed, 1*s*. 8*d*. Drawings.]

A.D. 1863, August 6.—N° 1947.

SIMMELKIAR, THOMAS, and SPICER, JOHN IBBETSON.—" An improved composition for coating or painting the bottoms of " ships or vessels to prevent them from fouling." This invention consists " in making a composition suitable for coating or painting " the bottoms of ships or vessels to prevent them from becoming " foul by the adhesion thereto of barnacles, seaweed, or other

" matters, which accumulate thereon." " For this purpose we " combine by boiling guano (by preference the best Peruvian) " with oil, by preference boiled in the proportion of about twenty " pounds of guano to one gallon of oil. After boiling together " for about a quarter of an hour (more or less), we gradually stir " in twenty-two pounds or thereabouts of red lead, after which " we add a few pounds of white lead. We then grind the whole " of these materials together, forming them into a paint by the " addition of oil if required, to which any suitable 'dryer' may " be added to cause each coat when laid on to dry quickly if " desired."

This composition is particularly applicable for protecting the bottoms of iron ships or vessels from fouling, and also for preserving the zinc or other metal sheathing of ships or vessels.

[Printed, 4d. No Drawings.]

A.D. 1863, August 18.—N° 2051.

YATES, JAMES.—" Improvements in the manufacture and fitting " or securing of armour plates, blocks, or bars, and in the " machinery or apparatus employed therein, parts of which im- " provements are applicable to heavy forgings generally." The invention relates " to certain peculiar constructions, arrangements, " and combinations of armour plates, blocks, or bars to the " means of uniting or securing the same together in their places " on fixed or floating batteries or defences, and to the machinery " or apparatus to be employed in the manufacture and manipula- " tion of such plates, blocks, or bars, or other heavy forgings.

" In carrying out the primary process of preparing the piles or " faggots from which armour plates, blocks, or bars are to be " forged or rolled, I combine together a number of thin bars of " iron made in the ordinary manner, and of the proper quality " to give the desired fibre or grain, which bars I place or pile " side by side in successive layers, each layer crossing the previous " one; or alternate layers of thin bars and flat plates may be " employed, or a single layer of wedge or trapezoidal-shaped bars " may be used. Projections and indentations corresponding to " the form of the mould or frame in which the blocks are to be " pressed or forged, as described in the Specification of Letters " Patent granted to me on or about the twenty-sixth of Februar

" One thousand eight hundred and sixty-three, N° 542, may be " formed upon the piles or faggots when preparing the same."

" The armour plates, blocks, or bars may be of a rectangular, " oblong, or hexagonal form, being shaped in peculiar moulds or " frames at one heating by rolling, stamping, or compressing, " substantially in the manner described in the Specification of " the said Patent herein-before referred to. When rolling is " adopted, I propose to employ a pair of vertical or oblique driving " rolls in combination with the horizontal rolls, but driven by " separate gearing of their own, and made adjustable so as to " take any width of plate. This combination of rolls may be " used for rolling armour plates and other similar heavy forgings " either with or without a mould or frame, the result in either " case being the production of a rolled plate, block, or bar, having " its edges as well as its faces perfectly even and smooth.

" In fitting up and securing armour plates, I combine face or " front blocks of wrought iron with back blocks of wrought or " cast iron, and secure the two together so as to break joint by " the aid of clip-headed or other bolts which take into beads or " projections in the plates, or into corresponding recesses or " niches made round the bolt holes at the junction of the plates. In some cases one or more bosses are made on the back of the front " plate or block, and a long " tie " bolt is screwed into each of " the back plates, being held in their places against the front " plates by clip washers embracing projections or beads on the " corners of the plates, and the whole is tightened up by strong " nuts or cottars."

" Another mode of arranging and securing armour plates con- " sists in combining a number of bars dovetailed into a suitable " backing plate, and provided with projecting or inclined sides so " as to retain the armour plates which are interposed between " them, the face of the work thus presenting a series of alter- " nate bars and armour plates."

" Another mode of arranging and securing armour plates is by " back stays or brackets resting upon foundation plates, and all " being keyed together by dovetailed keys."

The front blocks are in some cases stamped, as described, with a raised rib or head at each corner, and are so shaped or recessed at the corners, that when four of such blocks are fitted together, side by side, and corner to corner, a circular aperture will be left

at the part where the corners conjoin, for the passage therethrough of the peculiar clip-headed bolt which holds the plates together.

An annular groove is formed under the head of the bolt, and this groove fits over the raised head. Surrounding the circular aperture or bolt hole, formed by the junction of the four corners of the plates, a bolt hole is made in the centre of each of the back plates, through which the stem of the clip-headed bolt passes. By this arrangement of the front and back plates a perfect system of break joints is obtained, the contiguous corners of each set of four front plates uniting in the centre of a back plate, whilst the contiguous corners of four back plates unite in the centre of a front plate. The front and back plates are held firmly together back to back by the aid of strong keys or cottars driven through the clip bolts, or they may be held by screws instead of cottars, the heads of which bolts serve moreover to hold the front plates together laterally, and to cover and protect the corners from the direct impact of shot, whilst at the same time facility is afforded for the removal and replacing of broken bolts and plates, if requisite, during action.

According to another arrangement the front block or plate is stamped with a raised boss in the centre, at the back; and in this boss is formed a screw thread, into which the sustaining bolts are screwed. The back plate is formed at the corners with a raised bead, the front and back plates being held together by the screw bolts in the boss, on the back of the front plate, and the contiguous corners of a set of four of the back plates fit against and surround this boss, being held in position by a clip washer, which is hollowed on one side to clip over the raised bead, at each corner of the back plates. A strong nut, or a key, or cottar, serves to hold the front and back plates firmly together, whilst the bolt is of a sufficient length to secure the plating to a backing of timber, masonry, or earthwork.

Or there may be another form of stamped front block, having stepped or shouldered indents at the corners and edges, to receive corresponding stepped clip bolts. The back plates may be common undressed, rolled, or stamped plates, half the width of the front blocks, and of any convenient length. These clip bolts have one, two, or more shoulders pressed upon them near the head, and these shoulders are under cut or hollowed, in order to clip over or fit into the corresponding shoulders on the indents of the front blocks or plates, each bolt grasping the continuous corners

of two of the front blocks or plates, and the middle edge of the adjoining block or plate in the upper or under tier or row. Strong nuts screwed on to the stem of the clip bolts, or keys, or cottars, serve to hold the front and back bolts or plates firmly together. The heads of the last named bolts are flush with the face of the plating.

" According to another arrangement each clip bolt may be " passed through a clip washer which grasps a beading on the " contiguous corners of two back blocks, and the middle edge of " the adjoining block, and holds them together. A strong nut, " or key, or cottar, tightening the washer firmly against the back " of the block."

Or there may be several rolled plates or blocks, combined with rolled dovetailed locking ribs or bars, interposed between the edges of the plates, and dovetailed into a back plate.

Long holding bolts may pass through the back plates and timber framing, and extend thence to a further backing of timber, masonry, or earthwork, the heads of the bolts being countersunk into the back plates.

Or there may be hexagonal armour plates or blocks, which may be stamped either with a screw boss at the back, or with indented and beaded corners or angles for the reception of clip bolts, as desired.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1863, August 19.—N° 2060. (* *)

SCOTT, THOMAS.—(*Provisional protection only.*)—" Improve-" ments in the construction of floating docks, or apparatus for " lifting ships and other bodies."

These improvements are thus defined :—

" My invention consists in constructing floating docks as here-" after described, that is to say, I build two supporting vessels, " which form the sides of the docks, support the steam and " hydraulic machinery and are covered with a deck. Between " and entering to a certain extent through the inner sides and " into the interior of these supporting vessels there are beams or " girders, connected by chains to hydraulic rams, carried on and " under deck on each of the supporting vessels. Compartments " are made in the vessels for the reception of the ends of the gir-" ders, and every alternate compartment extends further inwards

" than the others, to allow of the rams being arranged in two lines.
" I construct a deck which rests upon the sides of the compart-
" ments and forms the top or cover for the same. Extending
" along this deck I fit longitudinal girders, and between them
" two rows of horizontal hydraulic rams, worked by a steam
" engine supported upon this or upon the upper deck; holes are
" made in the under deck, through which chains connected at
" one end to the transverse beams are carried, and passing over a
" pulley are attached at the other end to the hydraulic rams;
" vertical guide bars are connected to all or some of the transverse
" beams; they are furnished with or work against friction rollers,
" and are free to move up and down through the top of the com-
" partments and through the upper deck, which is supported by
" the longitudinal girders between which the rams are placed on
" the under deck, and by the sides and ends of the vessel."

" Supposing a ship to be upon the transverse beams and
" between the two supporting vessels, the whole of the rams are
" set to work simultaneously and raise the beams as well as the
" ship upon them. To ensure both ends of the beams being
" raised simultaneously and equally I connect the water supply to
" both sides of the dock by means of telescopic tubes, which are
" protected by the hollow vertical guide bars, and communicate
" with each other through a pipe carried at the side or other
" convenient part of the transverse beams."

[Printed, 4d. No Drawings.]

A.D. 1863, August 24.—N° 2097.

McKILLOP, Henry Frederick.—" Improvements in cleansing
" ships' bottoms." For this purpose " I employ an apparatus
" consisting of a sheet of canvas or other material having flexible
" tubes attached to it on three sides; these tubes are connected
" by a pipe with an air pump which is conveniently placed on the
" deck of the vessel. The apparatus is provided with cords or
" ropes, by means of which it can be passed under a ship's bot-
" tom and hauled to any part thereof where it may be required;
" then by inflating the flexible tubes they are rendered buoyant,
" and they then press against and fit closely to the side of the
" ship.

" In employing the apparatus in cleaning ships' bottoms, I
" coat the sheet of canvas or other material with tar or similar

" adhesive substance, and I powder over this unslaked hydrau-" lic lime; the sheet is then passed, by means of its cords or " ropes, under the ship, and to the portion of the bottom thereof " which requires cleaning; the tubes are then inflated and the " sheet is brought against the surface to be cleaned, from which " the lime quickly detaches the weeds, barnacles, or other shell " fish which may be adhering thereto.

" Another method of cleaning a ship's bottom by means of " this apparatus is to pass, in the first place, under the ship's " bottom a flexible ladder having attached to each round or step " a curved bar or arch, and when the ladder is in its place under the " ship's bottom each curved bar or arched piece stands out from " the surface perpendicularly, or nearly so, thereto; then, when " the apparatus is applied to the portion of the ship's bottom " where the ladder has already been placed, the centre portion of " the sheet of canvas or material is prevented, by the curved bars " or arched pieces of the ladder, from coming in close contact " with the side of the ship, but the tubes at the bottom and two " sides of the sheet still fit tightly to it when inflated, thus a space " is enclosed from which the water may be pumped, a hose from " the ship's pumps being let down into the enclosed space. The " portion of the ship's bottom enclosed in this manner is then " cleaned by throwing down lime on to it, and the cleaning may " be completed by a man descending the ladder into the enclosed " space, the curved bars or arched pieces of the ladder keeping " the centre portion of the sheet of canvas or material sufficient " distance from the ship's side to allow him to move freely. In " cleaning a ship I usually employ a double apparatus, so as to " operate at the same time on both sides of the ship."

[Printed, 1s. 2d. Drawings.]

A.D. 1863, September 5.—N° 2196.

RENNIE, George Banks.—" Improvements in the construc-" tion of floating docks and pontoons, and the means of cleaning, " painting, or repairing them." " I construct the base or pon-" toon of a floating dock with each end taper or pointed, or made " bow-like on the plan, instead of square, flat, or rectangular as " heretofore, and I carry the hollow side walls only as far fore and " aft as the sides of the pontoon are straight. By this plan and " arrangement considerable saving of material is effected, and

" the dock is better adapted for being moored and moved in a " current or tideway. I construct the base or" pontoon " portion " of a floating dock, such as that described in my Patent dated " 22 March 1860, N° 746, " (whether constructed as just described, " or of any other form), in separate chambers or distinct portions " or pieces, so as to launch them separately, and afterwards to " rivet, bolt, or otherwise fasten them together whilst in the " water." " For the purpose of effecting the rivetting, bolting, " or otherwise fastening together of two or more pieces or sections " of the base portion of the dock," " whilst they are floating in " the water, I " " construct a hollow box of rectangular or other " suitable cross section, and of a form or shape longitudinally " suited to the contour of the transverse section of the floating " dock, or of the base or pontoon portion thereof, so that the " length of the hollow box-like apparatus between the two vertical " ends or " columns " thereof shall exceed the width of the dock. " The sides of the base portion of the said box-like structure are " continued upwards for a certain height, and the upper extremi- " ties of these prolongations are so formed as to receive continuous " cushion pieces of vulcanized india-rubber, leather, or other " suitable yielding or elastic material, so as to fit the bottom of " the portions of the base of the pontoon or dock to be secured " together, so that a water-tight joint may be formed round the " parts requiring to be joined. This apparatus being sunk is " placed under the portions of the pontoon or base of the dock " intended to be joined together, painted, cleaned, or repaired, " and the water being pumped out of the horizontal portion of " the apparatus, the pressure of water acting beneath the same " causes the elastic cushions to fit closely and effect a water- " tight joint between the apparatus and the external surface or " bottom of the dock to be operated upon under water, the " water which would then be contained in the trough-like space " thus formed may be allowed to fall into the chamber formed by " the horizontal portion of the apparatus, and from which it may " be pumped; and when both those spaces are emptied, the " workmen " may enter thereinto. " The same description of " apparatus is intended to be employed for disconnecting the " parts of pontoons or the base portions of floating docks. The " vertical portions or columns being hollow, access is afforded by " means of them to the horizontal portions of the apparatus, and " workmen may readily pass down and up, and these vertical

" portions may also contain pumps, and the apparatus for work-" ing them. To these vertical portions similar projecting pieces " or fitting strips to those herein-before described may be attached, " for the purpose of making water-tight connection between the " vertical sides of the floating dock, to enable access to be given " thereto;" " or, instead of these fitting strips being attached, " they may be made to slide back and forth." The top of the rectangular box is provided with a series of openings or man-ho e doors to allow of the workmen passing through.

[Printed, 1s. Drawings.]

A.D. 1863, September 8.—N° 2210.

HEWITT, William.—" An improved rudder and means of " working the same." The rudder consists of " two blades " united by bolts, rivets, or otherwise, they are bowed outwards " at or about the centre, and are carried round a boss fixed on a " main shaft, the outer end of which protrudes beyond the vessel, " the blades are also so shaped as to fit into the boss at their " inner ends while their outer ends are furnished with pintles, " that on the lower blade is received and is free to move in a " step carried out from the vessel, while the pintle on the top of " the upper blade enters an eye formed to receive it in a metal " bearing fixed to and carried out from the vessel. A toothed " wheel is let in and fixed to the upper part of the boss, into " which a bevilled tooth pinion gears. This pinion is keyed on " a hollow shaft which is carried inboard through a stuffing box " over the main shaft, and has keyed on it a wheel with three sets " of teeth; one of these sets of teeth is placed in gear at will, " with a toothed pinion on a shaft communicating with the " engine room or with another pinion on a shaft carried between " decks, or with a third pinion on another shaft communicating " with the deck. When either of these pinions is set in motion, " the hollow shaft through the bevelled toothed pinion sets the " toothed wheel on the boss in motion and turns the blades of " the rudder 'starboard' or 'port' as desired."

[Printed, 10*d*. Drawing.]

A.D. 1863, September 9.—N° 2213.

TUCKER, Walter Henry.—" Improvements in the modes of " *propelling* and steering vessels." The invention consists, first,

in effecting the steerage of vessels by means of their propellers, by the use of one or more collar frames or swivel joints, so arranged as to admit of the propeller being moved round a vertical centre or line, without hindrance to its rotation on its longitudinal axis, and in various improvements in connection therewith.

Secondly, in new descriptions of rudders, applicable to all kinds of boats or vessels, and which can be used simultaneously with a steering propeller or otherwise as desired. The ordinary pintled rudder, being difficult of control in a heavy sea, it is advisable to provide one which, whatever be the force of the waves, shall be under command; it is also desirable that a vessel should be more rapidly steered than has hitherto been possible by a rudder.

In order to effect these purposes "I use a rudder which (while " in action) protrudes at a suitable angle from the side of a " ship, across which it runs in slides or guides, in place of turn- " ing on external axes at the stern, as has hitherto been the " case, by which arrangement the rudder is caused to glide into " and from the water edgewise, thereby encountering a minimum " of resistance to its movements from the water, while producing " from the unyielding surface it presents to the water before it, a " maximum of steering effect upon the vessel. One or more " such rudders may be used on each side of a vessel, and at " either or both ends of it or one only may be used if desired, so " arranged as to protrude on either side as required." "Or I " use one or more rudders mounted on horizontal shafts, so that " they shall project laterally from a vessel, and move into and " from the water edgewise; either of the before-named rudders " may by any suitable means be actuated either from the vessel's " deck or otherwise as desired."

The inventor claims, generally, the use, for vessels, of all such rudders as are so arranged and constructed as to move from the said vessels into and from the water edgewise, in a lateral direction, or in a line transverse to, or at an angle to the keel; but he makes no claim to the use of rudders which are constructed so as to move into and from the water edgewise, in a vertical line direction.

[Printed, 10*d*. Drawing.]

A.D. 1863, September 9.—N° 2214.

LILLIE, Joseph, and WHITE, John Haines.—"An im- " proved *composition* or *coating* for the protection and preserva-

"employment of flexible saw or other blades to which backward "and forward or reciprocating motions are communicated for "cleaning the bottoms of ships and other structures, and the "employment of flexible paint holders or pockets, with recipro- "cating brushes therein, of the same length as the saw or other "blades, and to be used in conjunction with the said cleaning "blades, or separately, but preferably the former, for applying "paint or other coating preparation to the bottoms of ships and "other structures."

"The apparatus consists of two ribs of steel or other flexible "material, one end of each of which is jointed or coupled to a "metal breech piece, and the other ends are left free, and termi- "nate in floats. The said breech piece is similar in form to a "ship's keel, towards its outer end are bearings for the axis "of a fan or archimedean screw, to which the saw or other "cleaning blades and the pockets' brushes are connected by "eccentrics or cranks. Both the cleaning blades and the paint "pockets, with their reciprocating brushes, are fitted into, to, or "on the steel or other flexible ribs, and all these parts are "preferably the full depth of the side of the ship to be cleaned "and coated from the keel to the load water line."

"When the said submarine mechanical cleaner and painter (or "either the cleaner or painter singly), which are composed "mainly of the parts herein-before named, are to be put to work, "the pockets are filled with paint or other coating substance, "and several chains or ropes to act as 'guys,' and for moving "the apparatus, are made fast to different parts. The whole "apparatus is then swung over the bow of the ship. A chain, "or two chains or ropes may be used, attached to the breech "piece is or are led from thence aft, say, through the stern "davits, then forward, and around the capstan, winch or other "engine for transmitting motion, and finally, say, by way of the "bow hawser-holes, carried to the breech piece, and again made "fast thereto; 'guy' chains or ropes are made fast to the floats "on the ends of the ribs. If the chains or ropes are now "hauled taut, the former (*i.e.* the breech chain or chains) from "stern to bow on deck, and the latter (*i.e.* the guy chains or "ropes) from the bow aft, the breech piece will be brought on to "the keel, and the flexible ribs with the parts fitted thereto, will "closely fit the sides or skin of the ship or vessel in two lines "vertical, or nearly so, one at each side. As soon as the appa-

" ratus is in position, the motion of the ship through the water " will cause the fan or screw, the axis of which rests in the breech " piece, as before mentioned, to rotate. The eccentrics or cranks " on the said axis will then give reciprocating and cutting or " cleaning motion to the saw or other blades sufficient to remove " the seaweed and shell fish, the two main retarders of a ship's " progress through the water. The brushes also by similar " reciprocating motion will allow a portion of the paint or other " coating substance, to escape from the pockets outwards, either " through the brushes or by the side thereof, and such paint or " other coating preparation will there be well rubbed on by the " brushes. The pressure of the water will be sufficient to cause " the coating substance, which should be of a class to 'set' " quickly in water, to run out. The chains or ropes being con- " stantly moved to haul the apparatus aft, both sides of the ship " will be thoroughly cleaned and painted or coated, and that all " over, for the flexible ribs and the parts thereto attached will " accommodate themselves to the form of the ship or vessel. Of " course the action of the working parts is not entirely dependant " on the motion of the ship through the water. Chains from the " deck could be used."

[Printed, 10*d*. Drawing.]

A.D. 1863, September 18.—N° 2295.

BAGGS, ISHAM.—" Improvements in the means of protecting " and preserving the hulls and bottoms of ships and vessels " from fouling and corrosion." The invention consists in preserving or protecting the hulls or bottoms of ships from fouling and corrosion by means of electricity, however obtained and applied.

" For the purpose of preventing the hull or bottom of a ship " or vessel from fouling by the adhesion of barnacles, shell fish, " seaweed, and other substances, I employ by preference, the " secondary current arising from an intensity coil.

" I place in any convenient part of the ship a powerful battery " hung in gymbals, the two poles of which battery are connected " at such times as are needed with the two extremities of the " primary coil. One end of the secondary coil is placed in perma- " nent connection with the hull or bottom of the vessel to be " protected. The other end of the secondary coil is placed in

... as may be desir...
... surface of su...
... may requir...
... of steam ship...

... blocks as being ...

... of any vessel from decay or corrosion ...
... battery also hung in symbols ... some ...
... ship. The negative pole of this battery ...
... contact with the hull of the ship the other ...
... or conductors hanging outside the ...
... and being attached to the positive pole ...

... when copper sheathing or Muntz's metal ...
... in the form of bolts, nails, or otherwise, attached ...
... way connected with such sheathing, in conjunction ...
... coil or other electrical apparatus."

[... 8d. Drawing.]

A.D. 1863, September 18.—Nº 2303.

SMITH, WILLIAM.—(*A communication from John Gregory.*)—"Improvements in the construction and mode of working ordnance for ships and forts, and in the means of protecting those engaged in working guns employed for such purposes."

"For the purpose of carrying out the first portion of my invention I make a double gun by forging, casting, or otherwise "forming a central breech block with trunnions, the body or "barrel of each gun being in" "the same axial line, but the "description of bore and mode of rifling may be of any kind

" which may be preferred. The trunnions of the gun are sup-
" ported in a bracket or carriage, which in turn is mounted upon
" and free to revolve on a kerb or plate on the upper face of a
" gun carriage or traversing frame. The gun being double,
" each barrel has a separate touch-hole and means of igniting
" the charge, and is so mounted as to turn on a pivot or centre
" when it is withdrawn from the port or embrasure by the recoil
" of the preceding discharge, and the gun may then be loaded in
" the position to which it is brought on the gun platform by the
" recoil, or it may be turned round quarter of a circle, or any
" lesser or greater degree. Both ends of the gun may then be
" loaded with great facility, or one end only of the gun may be
" loaded and" "fired continuously until becoming heated, when
" the other end of the gun being spunged out and cool it may be
" loaded and in its turn be discharged. Where no arrangement
" for closing the ports by the recoil of the gun is employed, the
" men are protected from the enemies' fire whilst loading when
" the gun is turned horizontally after firing, as they are not
" required to stand in the line of the opening or port or em-
" brasure but are placed on each side thereof.

" Instead of leaving the embrasures or ports open, or instead
" of closing a ship's ports by means of hinged shutters or covers,
" sliding covers are fitted on the outside of the ports, and they
" are closed and opened either entirely or partially by means of
" chains or ropes actuated from within by the recoil of the gun,
" whether such ports or openings are in a ship's side, or in a
" cupola, or in an iron-plated or other fort. The sliding covers
" or shutters may work vertically or horizontally, or may be
" made to turn on a centre or pivot, and may be connected by
" means of pullies or chains or other equivalent means with the
" carriage of a gun (either constructed according to the present
" invention, or of any other kind or description) the recoil of
" which is caused to close the shutter after each discharge. As a
" protection to those engaged in working guns on board that
" class of vessels known as cupola or turret-ships from projectiles
" entering the side or sides thereof, I make the cupola in such
" vessels fixed by preference, and only one in number, although
" the cupola or cupolas may be made to revolve, but in each case,
" whether the cupola be fixed or revolving, or whether there be
" only one or more cupolas or turrets, or whether the guns be of
" *the kind included in* my present invention or ordinary guns, I

"construct such vessels with special side compartments," "with "a view to the preservation of the vessel, and of those on board "working the guns, in such manner that should a shot perforate "the ship's side, the water would merely find its level in the "compartments." "When not in action the compartments may "be used as quarters for the crew, the necessary ventilation being "effected by a fan, blower, or other suitable means."

"For the purpose of protecting the men engaged in working "guns in circular iron or other shaped forts or fixed turrets from "the various angles of fire externally or internally, to which the "men may be exposed, a series of mantlets or screens are disposed "between the guns, and behind which those working them retire "for protection, and the powder magazine is also surrounded and "protected by mantlets or screens."

[Printed, 1s. 4d. Drawings.]

A.D. 1863, September 21.—N° 2331.

DAFT, THOMAS BARNABAS.—"Improvements in the construc- "tion of iron ships and vessels, and in sheathing the same." "I "construct iron ships or vessels with plates of iron of the usual "thickness and size, and upon the principle of what is termed "'butt' or flush joints horizontally as well as vertically, having "strips or bands on the inside of the plates, and with a double "row of rivets or two double rows of rivets as is usual with flush "joints; but I do not allow the edges of the plates to touch each "other, on the contrary they must be kept a certain distance "apart, say half an inch, for the purpose of being caulked or "filled in between and around the plates with strips of hard "india-rubber," wood (such as teak), "or other suitable insulating "material, into which I bore holes if necessary, and with suitable "short nails fix on metal sheathing, taking care to interpose a "sheet or sheets of insulating material between the metal sheath- "ing and the iron plating of the ship or vessel. When ships or "vessels are plated in other ways, as for instance when rebated "or flanged plating is used, for the purpose of avoiding rivets on "the outside, I arrange to leave a space or groove between the "plates both vertically and horizontally in order to receive a "caulking or filling-up of insulating material for the purpose of "nailing or otherwise fixing on metal sheathing to the sides or "bottom of the ship or vessel. Other modes of constructing or

"plating iron ships or vessels may also be employed, so long as "grooves are produced on the exterior of the vessel for the pur-"pose of receiving insulating material on to which to nail or fix "metal sheathing."

"According to this invention the plates may be used with their "edges rough from the shears, as the roughness serves the better "to hold in the caulking material. When shearing the plates a "bevil may be given to their edges, and the plates so arranged as "to produce dovetailed grooves, that is, wider at the base than "at the surface, so that when certain dry and hard materials "such as teak, and which may be stored and compressed, be "driven or 'caulked' in with force it will afterwards expand "and thoroughly fill up the grooves at the base as well as at the "surface. A waterproof cement may be usefully employed in "conjunction with the caulking of teak or other material."

If zinc sheathing be employed, then, as zinc preserves iron, there is no necessity for insulating it, and no danger in zinc nails touching the iron.

[Printed, 4d. No Drawings.]

A.D. 1863, September 26.—N° 2371.

SPENCE, James.—"An improved plastic composition appli-"cable to the coating of metallic and other surfaces." The chief object of this invention is "to prepare a plastic composition "suitable for coating metallic surfaces, and protecting the same "from oxidation or rust. A plastic composition to be applicable "to such uses should possess the property of setting like cements, "and yet retain an amount of elasticity sufficient to enable it "when applied to yield without cracking to the contraction and "expansion of the metal under variations of the temperature. A "composition possessing these qualities, I produce by the intimate "combination of argillaceous earth, water, oil cake, fish oil, cow "hair, and carbonaceous and colouring matter with Portland, "Roman, or other like quickly setting cement. The elasticity of "this composition, coupled with its strong drying or hardening "property, renders it specially suitable for protecting the internal "surfaces of iron ships from the action of bilge water, and thereby "preventing rust or oxidation."

"The following is the mode of preparing a coating for the "internal surfaces of iron ships to prevent the oxidation or rust

[illegible] The proportion given may, however, be varied to suit varying circumstances. I take of argillaceous earth, say, [illegible] lbs., and mix it thoroughly with water to convert it into a paste. To this quantity of paste I add the following substances in about the proportions given, viz., oil cake, 24 lbs.; " fish oil, 3 gallons; cow hair, 24 lbs.; soot, 24 lbs.; bone dust, " or bone ash, 3 lbs.; stirring, grinding, or kneading the same, " so as to ensure the intimate admixture of the ingredients, and " I thus obtain a compound of about the consistency of plaster " prepared for covering walls. To give the compound the pro- " perty of quickly setting, I add thereto from one-eighth to one- " sixth of its weight of Portland, Roman, or other like quickly " setting cement."

[Printed, 4*d*. No Drawings.]

A.D. 1863, September 28.—N° 2379.

CATO, PETER.—" Improvements in the construction of com- " bined iron and timber ships." This invention relates to " that " class of combined iron and timber ships in which the ribs or " frames are made of iron and the skin or planks of timber, " and the object thereof is to build or secure together more " firmly, and make more taut, the hull of a ship, and to relieve " the through bolts from the strain which they have to bear " in ships of this class constructed in the usual way.

" In ships constructed according to my improvements, the three " main parts, the ribs or frames, the planks or skin, and the through " bolts are of any usual shape, kind, or description, and are fitted " together as may be found most suitable. Secured to and pro- " jecting from the outer surfaces of the frames or ribs are a " number of pieces, say, of metal, which take into sunk recesses " or spaces on the inner surfaces of the planks or skin, or the " inner surfaces of the planks or skin may have sunk spaces " which fit on to the frames or ribs, the object being, as above " stated, to bind the ribs or frames and the planks or skin " stiffly together. The arrangement of parts which I prefer, " however, is neither more or less than a dowel joint formed by " securing to the frames or ribs, by rivets, cylindrical pieces of " cast iron which have holes corresponding thereto in the timber " planks or skin to allow them to be brought close up to the risb " or frames."

[Printed, 8d. Drawing.]

A.D. 1863, October 1.—N° 2409.

LESLIE, Percy.—" Improvements in preserving the bottoms of " ships or vessels and other surfaces from the prejudical effects " of marine animals and vegetables." This invention consists in first applying to or paying over the bottoms of ships or vessels and other surfaces, a suitable adhesive material or compound, and then applying thereto poisonous matters, so as to cause them to adhere by reason of the previously applied adhesive matter or compound to the bottoms of the ships or vessels or other surfaces.

" It should be stated that it has before been proposed to em- " ploy poisonous matters in combination with adhesive materials " mixed together, and then payed over or applied to the bottoms " of ships or vessels and other surfaces, but I have ascertained " that the mixing of the poisonous ingredients with the adhesive " matter does not produce so beneficial a result as when the " adhesive matter or compound is first applied.

" The adhesive matters which may be employed in carrying out " this invention are pitch, tar, resinous and other gums, and " other adhesive materials. The poisonous materials which may " be used and applied after the adhesive matter or compound has " been payed over the surfaces are the salts and oxides of arsenic, " baryta, mercury, copper, or other metals, or other poisonous " substances."

[Printed, 4d. No Drawings.]

A.D. 1863, October 9.—N° 2476. (* *)

JAMES, Enoch Watkin—(*Provisional protection only.*)—Improved apparatus and arrangements "for giving buoyancy to or " raising sinking or submerged ships, and other sinking or " sunken bodies."

This apparatus is thus described:—

" My invention consists in the use of air-tight bags or cases, " with flexible air-tight tubes connected thereto, so that these " bags, when unfilled or uninflated with air, gas, or buoyant " vapour, may be readily passed to a sinking or submerged ship " or body, and after being firmly secured in or to the same " may be filled or inflated with air, gas, or buoyant vapour, " through the air-tight tubes aforesaid, by which means the ship

" or body will be quickly buoyed up or raised to the surface. " And such bags or cases and tubes might be kept on board of " ships and vessels, and might, when a ship or vessel is in danger " of sinking or foundering, be inflated with air, gas, or buoyant " vapour, giving buoyancy and avoiding wreck. When a vessel " or body is embedded in sand or mud, I should, in order to give " a 'start' to the same, sink to beneath it a blasting tube with " small powder receptacle at its end, and apply only a sufficient " charge to just move the vessel, and not sufficient to destroy or " injure it."

[Printed, 4d. No Drawings.]

A.D. 1863, October 9.—N° 2478.

McINNES, JOHN.—" Improvements in sheathing for navigable " vessels of iron or wood, which sheathing is also applicable to " to the covering of roofs, walls, and other purposes." This invention consists "in applying to the external surface of the " bottoms or hulls of ships or other navigable vessels, whether " constructed of wood or iron, a sheathing of paper, calico, or " other textile fabric, which has been previously saturated with " any suitable material or composition which will protect the " bottoms of the vessels to which it is applied from oxidation and " the adhesion of animal and vegetable matter, which materials or " compositions may be of any of the ordinary kinds used for " that purpose; but the composition I prefer for saturating and " coating the paper, cotton, or other textile fabric, is that for " which I obtained " Letters Patent bearing date 21 June 1854, N° 1356, and known as " McInnes' Metallic Soap for Coating " the Bottoms of Iron ships."

" When this improved sheathing is to be applied to other pur- " poses than to the external covering of the hulls of navigable " vessels, I confine myself to the use of " this " metallic soap for " the saturation and coating of the paper, calico, or other textile " fabric;" " as paper, calico, and other textile fabrics saturated " with tar, oil, and other repellants of damp have been commonly " used for that purpose."

The invention further consists in the use and application of the improved sheathing, made with the said metallic soap, when applied between the double planking of the hulls of vessels constructed *with diagonal*, vertical, or longitudinal double skins, so as to

resist the action of worms against the inner skin, and make the joints of the planking in rear thereof impervious to water.

This improved sheathing may be made to adhere to the surface which it is intended to cover, by means of any suitable adhesive substance, by heat, nails, or in any other convenient way.

[Printed, 4d. No Drawings.]

A.D. 1863, October 12.—N° 2495.

HARTLEY, John Galley.—(*Provisional protection only.*)—
" Improvements in the construction of iron and wooden ships
" and other vessels." The invention consists in " constructing
" ships and other vessels, whether of wood or iron, with a skeleton
" or framework of iron rods or bars and of bossed plates, straps,
" or binders slided on or fitted to them, and in fastening to the
" said skeleton or framework an iron or wooden skin or planking.
" The rods or bars may be round, square, tubular, or of any con-
" venient form, but I consider round preferable as avoiding the
" necessity, trouble, and expense of bevilling which obtains in
" bending angle iron. The intention is to render punching the
" skeleton or frames unnecessary, and by the term bossed, as
" used, is intended plates, straps, or binders, having any con-
" venient description of boss, or lug, or clip, or attachment to
" the bars or framework not consisting of or requiring holes
" punched or made through the body or general thickness of the
" frames. And the said plates may be of various forms to suit
" or receive the floors, stringers, beams, inner skin, outer skin,
" or planking, breast hooks, bulkheads, bilges, and other (if any)
" parts of the vessel where fastening by bolts or rivets might
" otherwise be required, and may be shifted to suit any vertical,
" horizontal, or other curve or water line of the bows or stern.
" To prevent oxidation the plates, straps, or binders, may be
" galvanized. By this construction it is apprehended that more
" than the ordinary strength may be obtained."

[Printed, 4d. No Drawings.]

A.D. 1863, October 13.—N° 2512.

SCOTT, Thomas.—" Improvements in floating docks." This invention has for its object, first, " the means of giving access
" above the water line to the base or lower part or parts of the
" structure for the purpose of disconnecting any portion of such

" base or lower part from the side walls of the structure, which " are each continuous from end to end, and connecting it or " them again when required, and consists in forming a space or " chamber between the side walls or girders and the base or lower " part or parts of the structure, of sufficient width and depth to " admit of the operation of withdrawing bolts and nuts or other " means of fastening from the plates by which the side walls are " connected with the base or lower part or parts of the structure, " and of re-inserting them when required in order to restore such " connection. This space also allows of access being had to the " glands or stuffing boxes forming the pump connections between " the upper portion or side walls and the base portion or portions " of the dock for the purpose of detaching and afterwards re- "-attaching the same. By this means the base or lower part or " parts of the structure being constructed in sections, one or more " of such sections may be removed for the purpose of repair or " otherwise, and be replaced as required without interfering " with the efficiency of the dock.

" Second, in constructing the side walls separate from the base " portion or portions, as distinct structures, capable of being " floated, towed, and manœuvred independently, and rigid and " self-sustaining, and capable of imparting rigidity of structure " and perfect combination when such side walls have been " brought over and been connected to the ends of the sectional " portions of the dock represented by the pontoons or base " portions of the dock.

"The engines, pumps, and working apparatus generally are " contained within the side walls, and placed by preference in a " separate compartment situate in the centre of the length of each " thereof. Each of the pump connections of the several sections " of the base of the dock is separately connected to the corre- " sponding pump connections of each of the side walls of the " structure."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1863, October 14.—N° 2522.

BONNEVILLE, Henri Adrien. — (*A communication from François Capponi.*)—" An improved apparatus for cleaning ships' " hulls." This apparatus consists of a moveable shoe or block, which fits under the keel of the vessel, against which it is held by

levers worked by cords from above. In this shoe are rollers to facilitate its motion along the keel, and others over which the lines may work, to which the brushes are attached. These lines are also carried over rollers or sheaves on a floating stage, from which the apparatus is worked, and from which the shoe is suspended by lines.

When the apparatus is placed at the part of the vessel it is wished to clean, it is held in place by means of the levers acted upon by the cords attached to the rafts. The brushes may then be made to descend by means of the cords, and having less specific gravity than the water they are held vertically, and their contact with the hull is assured. By means of other light cords the brushes are raised when the form of the vessel's hull prevents them from rising alone.

"The apparatus may be used simultaneously on both sides of " the vessel, or on one side only, and in the latter case one of the " rafts may be dispensed with, by attaching the cords of the " opposite side to that where the cleaning is being done to the " vessel itself."

[Printed, 8*d*. Drawing.]

A.D. 1863, October 15.—N° 2530.

FLEXEN, STEPHEN.—" An improved apparatus for ventilating " railway and other carriages, houses, buildings, steam and sail- " ing vessels of all kinds, moveable or otherwise." The invention consists of " an apparatus in which a roller and pulleys or " wheels and lines, cords, gut, tapes, straps, or chains are com- " bined as follows with a folding louvre ventilator placed at " the upper part of a sash frame, window frame, or other similar " frame, that is to say, I fix a flexible line, cord, gut, tape, strap, " or chain (by one end) to each side of the bottom of the ventila- " tor, and I pass the other end of each such line, cord, gut, tape, " strap, or chain over a pulley or wheel, or pulleys or wheels, and " I fix it to a roller towards the centre of the roller, such roller " being placed immediately above the ventilator, so that when " the roller is turned round for the purpose of raising the venti- " lator the said lines, cords, guts, tapes, straps, or chains attached " to the bottom of the ventilator shall wind round the roller " worm-like *or spirally* without entangling. I work or turn the

" roller by a cord, gut, tape, strap, line, or chain coiled round one " end of the roller."

The invention may be employed for excluding dust, and for stopping or regulating the passage of drafts of air, vapours, or gases into and out of houses, vessels, or carriages.

[Printed, 8*d*. Drawing.]

A.D. 1863, October 17.—N° 2549.

MONCKTON, Edward Henry Cradock. — " Improve- " ments in the means of uniting or joining plates or sheets of " metal, which invention is applicable to the construction of " boilers, tubes, and other useful purposes." The improvements consist in a novel method of generating and applying heat to the metal to be operated on; in the preparation of a suitable flux; and in the method of uniting plates of metal so as to render the joint as strong as the plate itself, thus obviating for the most part the necessity for using rivets, and giving additional strength where rivets are used; and, fourthly, indented and corrugated sheets of metal are made to overlay, to be riveted, or brazed, or both.

The joint effected by soldering or brazing as now carried out is, the inventor states, clearly either inferior to the rivet, or the difficulties attending the process are insuperable. What he purposes doing is, "to improve the well-known process, so that tubes " suitable for sustaining immense pressure suitable forhydraulic " presses, cannons, and guns, and plates suitable for steam boilers, " ships, and other appliances, may be united by brazing and " soldering, so as to effect a junction superior in strength to any- " thing heretofore attempted by common brazing, soldering, or " rivetting as at present practised."

The method of carrying out this invention is as follows:—All metals must be previously cleaned at the parts to be united; this may be effected by scouring, scraping, and also by dipping in acids, and then in caustic solution of soda to remove the acid, and then washing in water.

A solution of any suitable fluxion water, which is preferable for the purpose, is rubbed over the clean surfaces, and dried on them.

The brazing powder or solder is mixed with suitable fluxes as described.

The parts of the metal to be united are prepared at once to the proper level or thickness at the rolling mill, or under the hammer,

the swages, or otherwise; and are then, at pleasure, either dove-tailed together or made so as to fold into each other, and the plates are simply laid together and fastened by a few small rivets, or secured by wire or otherwise.

The whole is then either heated in a suitably constructed furnace by the "ignited commixed gas" (as described), or by means of jets of gas, without a furnace, applied to one or both sides of the metal by the ordinary gas blow pipe, with air actuated by bellows, or the oxyhydrogen blow pipe may be similarly used, the solder being supplied as required.

"The extent of the overlap must be determined by the strength " of the metal compared with the strength of the soldering material, " always allowing a margin in excess in the overlap, in order to " remedy any accidental defects in the brazing or soldering."

"The outer end of the metal should in some cases be slightly " raised, so as to admit of the solder lying easily, and having a " free run into the join. I prefer as brazing material a compo- " sition made of brass, varying in proportions of copper from 50 " to 75, zinc 30 to 50, for iron and steel. I also use copper in pro- " portions of from 85 to 95 per cent., and tin from 15 to ·5 per " cent."

"I further use an iron frame made moveable, so as to be con- " veyed along the join or seam to be united, containing a fire, " actuated by bellows, so as thereby to melt the solder and com- " plete the join, in lieu of using gas where it is inconvenient to " procure or use the latter."

"I adopt the following novel method of constructing large or " small tubes suitable for cannon, steam boilers, and hydraulic " and other purposes, by not only greatly increasing the overlap " to be brazed, but also by coiling their metal previously cleaned " and dipped in the fluxing solution, and dried round and round " till a sufficient thickness of metal is attained, and then applying " the brazing or soldering material to the end and fluxing it, the " whole tube being simultaneously heated so as to cause the " fused metal to flow into the interior." "Should the tube be " very long, each end in succession may be brazed by burying " part of the cylinder in an upright position in the earth while " the other end is subject to the heating process."

"Clay is used to sustain the solder where it is required in " excess, and which is to be added as wanted, and clay is also " used to prevent the oxidation of the surface not being soldered."

"A seamless steam boiler or ship may thus be constructed "without a single rivet, an enormous saving being effected by "doing away with the paint used between the joints, and in "caulking them with chisels, as also in the immense saving in "weight of metal."

"Copper sheathing may be simultaneously soldered together, "and secured to the bottom of an iron ship, thus rendering all "access of sea water to the iron, and consequently all galvanic "action, impossible."

"The above methods and principles are applicable to all metals "and alloys capable of being united by the soldering process."

"In some special cases the metal may be confined in a case and "heated, and the solder previously fluxed may either be run "down a long heated tube placed above it, so as to cause the "fluxed metal to be driven into the parts to be united by means "of the pressure of the metal above; the tube is also heated, "and the metal may be either fluxed in a furnace placed at its top, "and then run in, or be poured in from pots raised from a "furnace below; it is not necessary that in every instance the "whole of metal to be joined should be increased, but only that "part where the solder is first run into, for example, the end of "a coiled tube; the whole tube must nevertheless be heated. "Another method is to cause the fluxed metal to run into a case "containing air communicating with the tubes connected with "the case above mentioned, whereby the pressure of the heated "air will assist in driving the fluxed metal into the joins through "a much shorter tube; by either means the process will be much "shortened, and consequently the metal to be joined be subjected "to less heat than by any other means now in use."

"As the addition of the metals to iron causes local galvanic "action to a certain extent when immersed in sea water, in such "cases (as in ship building) the iron to be united should be "previously galvanized, which would completely check the "effect."

[Printed, 6d. No Drawings.]

A.D. 1863, October 22.—N° 2593. (* *)

BAILLIE, Robert.—"Improvements in the construction of "floating docks."

This invention "has for its object the construction of floating "*docks with pontoons* for the sides, combined with transverse

" and longitudinal girders forming the bottom of the structure, " such sides and bottom being respectively independent of each " other, except as they are connected by a number of hydraulic " cylinders and rams, or other mechanism for raising and lower- " ing the bottom of the dock as required. For this purpose the " sides of the dock are by preference composed of a series of " pontoons, braced together by longitudinal girders, with a space " between each pontoon of greater width than the main trans- " verse girders of the bottom, so as to admit of these girders " passing up between the pontoons when the bottom is raised, " and thereby forming a level or nearly level surface on the " under side of the dock. But the sides of the dock may be " composed of oblong pontoons extending the whole length " thereof, in which case the said main girders would rest against " the under side of the dock when in their highest position. " The ordinary wooden flooring of the dock is fixed on the trans- " verse girders of the bottom. Vertical racks are fixed to the " main girders of the bottom of the dock, which racks are " retained as required by palls fixed to the longitudinal girders of " the sides, and there are antifriction guide rollers fixed against " the side of the rack which is opposite to the palls; or friction " cams and plain vertical rods may be substituted for the racks " and palls. And there are vertical lattice guides fixed to the " main girders to strengthen the bottom of the dock against a " tendency to lateral straining, such guides being capable of " passing upwards between antifriction rollers fixed to the sides " of the dock."

" In lowering a ship the hydraulic pressure must be applied " underneath the cams, the racks or bars must then be released " from the retaining palls or cams respectively, and the pressure " let off, when the dock bottom with the ship or vessel will " gradually descend in the water."

[Printed, 10*d*. Drawing.]

A.D. 1863, October 23.—N° 2611.

JÜRGENS, JÜRGEN LORENZ.—" Improvements in vessels of " war." The primary object of this invention is to so construct a vessel that she may be penetrated by shot without injury to her vital parts, machinery, armament, or crew. This object is to be

accomplished by forming that part of the ship above the water line to the upper deck, and below the water line to the lower deck, with a series of oblique-sided chambers passing transversely through the ship, wide at the centre and converging toward each side. The spaces between the said chambers will thus be funnel-shaped, converging from each side toward the centre. The sides of the chambers are covered with metallic armour of moderate thickness, laid upon wooden sheathing, with a body of india-rubber or other elastic material placed between. The tops of the chambers are also metal plated, and incline downward at their ends towards the sides of the ship. In the lower parts of the spaces between the aforesaid chambers are masses of cork, or other light materials, extending up to the water line, so that, in the event of the spaces being pierced by shot, no more water can enter than will fill the space traversed by the shot, and thus the buoyancy of the vessel will be but slightly interfered with.

The masts are constructed in tubular form, with a central tube of iron, and a body of india-rubber, cork, or analogous material interposed between the said tube and the outer shell of the mast. The step on which the central tube rests constitutes a swivel, on which the tube may turn freely, so that any shot striking the tube on either side of the exact centre will turn it within its elastic case, and thus glance off. To increase the elasticity of the surrounding material, and the fredom with which the tube will turn, a small space is left between the said tube and its casing.

Above the upper decks are bulwarks, strongly iron-plated, projecting upward to a sufficient height, and inclined inward from the perpendicular at a sufficient angle to protect men and boats upon decks from injury from an enemy's shot.

The smoke stacks are constructed of telescopic tubes with perforated conical joints, and may be let down to a level with the bulwarks to preserve them from injury while in action.

On the outside of the bulwark are light iron bars running fore and aft, and furnished with projecting pikes to keep off boarders. The said pikes may be raised or lowered simultaneously by means of transverse connecting rods worked by hand or by machinery.

To protect the ship from the assaults of rams or other vessels, pivoted guard wings are employed, projecting from the sides, beneath the water. When not in use the said wings lie against the sides of the ship, so as not to retard her motion, but they

may be thrown outward at any suitable angle to sheer off the attack of a ram or other vessel, or to impede her motion and manœuvres.

The spaces between the inner and outer skins are divided into water-tight compartments, from each of which a pipe rises to the upper deck. In the event of fire occurring in the lower part of the hull, its locality will be indicated by smoke rising through one of the aforesaid pipes, and it may be extinguished by forcing water down the pipe.

[Printed, 1s. 2d. Drawings.]

A.D. 1863, October 26.—Nº 2641.

VIAN, Marius. — " Certain compositions for preserving iron " ships and other submerged ironwork from corrosion and from " fouling." This invention relates to " an improved fero-man- " ganic mixture for preserving surfaces of iron exposed to the " action of water by preventing oxidization and adhesion of " weeds, animalcules, and other substances." In the first place two coatings of the paint are given to the whole surface to be protected. This paint is composed as follows :—7 parts of yellow wax, 60 parts of essence of turpentine, 17 parts of oil saturated with manganese in the proportion of 10 per cent. ; total, 84 parts of oil mixture. To make up the paint, take 1 part of oil mixture, 1 part of white lead ; forming two parts of liquid paint. Wax is melted separately, and then mixed with the oil saturated with manganese and the essence of turpentine, and well stirred.

The final operation consists in spreading with a trowel over the coatings of paint a sort of putty. This putty is made as follows :—Take 10 parts of oil mixture, 15 parts of white lead ; to this add 15 per cent. of bi-oxide of mercury, and 15 per cent. of arsenic acid ; or simply 20 per cent. of bi-oxide of mercury.

[Printed, 4d. No Drawings.]

A.D. 1863, October 28.—Nº 2673.

KENNEDY, John. — " Improvements in the construction of " ships of war and other vessels, and in masting and rigging " the same." " The objects of my invention are, first, to re- " duce to their *minimum* the forces constituting the impeding

"elements below the plane of floatation which oppose the "motion of the body through the fluid."

2. "To obviate the tendency of the ship to roll and pitch "and 'scend in a seaway, and thus to render unnecessary any "disposition of weights for that purpose."

With these objects, "I take a form resembling the body of "any fast sea fish, say, for instance, the dolphin and porpoise "for a heavy class of ship, the mackerel and bonito for a fleet "description of vessel, and the sword fish for a fast class of "war vessel. I cut it through its length in two halves by a "horizontal plane; I discard the dorsal half, and retain the "ventral half to operate upon. I divide the latter longitudinally "through its middle by a vertical plane. I separate these two "halves or sections laterally, so as to leave a space between the "two plane surfaces, which are perpendicular and parallel to "each other. The width of this space may be either equal to "or greater than the largest ordinate of the largest vertical "cross section of the solid at each side of the space as may be "required, according to the nature of the service for which the "vessel is intended. Each of the flat plane surfaces forming "the sections of each solid at the division now becomes a new "axis, so to speak, fore and aft, one at each side of middle "line, and corresponding with the greater breadth of the con-"struction when completed. I obtain all the necessary curves "for the transverse vertical sections and for the horizontal and "diagonal sections for the outside surface of the body by cutting "the quarter body with planes in various directions and inclina-"tions with the horizon or vertice. The space inside of the "longitudinal quarter sections and between the plane sectional "surface of the two quarter bodies I form by means of hyper-"bolic or parabolic curves, or any other fair curves which join "the two bodies together in such manner that a hollow space "is produced under the breast of the bow, gradually diminishing "until it becomes flat at the largest cross section, where it again "begins to hollow and continues to hollow towards the stern, "thus forming two distinct after ends below the counter. At "any given height above the line of deepest immersion at the "largest transverse section, I produce a line corresponding in its "function with the height of main breadth in ordinary construc-"tion. This curve sweeps somewhat in a downward direction as "*it approaches* the apex of the bow, and it sheers very little

" towards the after end. Another principal curve is the line " constituting the lower boundary of a vertical longitudinal sec- " tion through the middle of the structure; its function is to " define the positions or points where the various curves belong- " ing to the longitudinal midship body unite and join. This " curve, which I designate the 'mid vertical curve,' does not " correspond with any line or curve in ordinary construction; its " extreme forward point intersects the height of breadth line, and " its aftermost extreme point touches the same line as it crosses " the counter and intersects the largest transverse section at any " point within the greatest immersed depth; the curve may be " parabolic. The other principal lines form the outline of the " bottom at the quarter longitudinal vertical section, and which " correspond to the upper edge of the rebate of keel and beard- " ing at both ends in ordinary construction. These lines are " straight along the mid-bottom within any convenient distance " from the ends of the ship, for the purpose of affording a " sufficient extent of straight surface along the bottom of the " vessel to sit upon while in graving dock or on a gridiron; " otherwise I prefer that they should be curved lines fore and " aft. Forward they rise and curve inwards toward the middle " line of the ship with an easy and gradual sweep until they " merge into the height of breadth at the extreme point of beak, " rounding into and partaking of the sweep of height of breadth " as it approaches the middle vertical section. At the after end " these lines begin to curve from the straight portion upwards " until they terminate within a small distance of and under the " aftermost bearings of the propeller shafts, thus totally taking " away that portion of the structure usually called 'dead wood.'"

" The body above the height of breadth may be fashioned " according to the nature of the service for which the ship is " intended, but it is preferred that the structure above the height " of breadth should diminish or fall inward, giving a roundness " to its exterior, which will tend to diminish the severity of the " shocks which the seas and waves produce in striking a fabric " having upright or outspreading upper works.

"The stem or centre of beak above the height of breadth I " propose should be carried back considerably, the face or cheeks " also falling inwards from the bow height or breadth at each " transverse section, causing an angle more or less acute in the " *transverse vertical section*, at the point of height of breadth

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"Another curve, merging into the height of breadth at the "largest transverse vertical sections, crosses said sections, and "passes through the centre of the propeller shaft. This line fur-"nishes at its intersection of the various transverse sections the "position and height of the conjugate diameter of the ellipses, "forming the curve of each transverse vertical section below this "height, and its joining with the quarter longitudinal sectional "curve the height of main breadth, constituting the position "of the conjugated diameters of the elliptical transverse vertical "sections of the immersed bow body.

"I form all the transverse vertical sections for the full length "of the immersed body of any portion of an elliptical curve "between its transverse and conjugated diameters; the perpen-"dicular lines through that portion of the cross sections which are "at and correspond to what are herein-before termed 'the quarter "'longitudinal vertical sections' being the transverse diameters "of the same figures, and whose lengths are equal to twice the "distance between the points of their intersection of the line of "floatation, and that line or curve forming the outline of the "bottom at the same longitudinal vertical sections. I complete "the remaining portion of the curves of the transverse vertical "sections belonging to the after body below the height of breadth "by joining to them such curves as will conveniently terminate "at the various points of intersection of these sections with the "main breadth line. These lines or curves constitute the principal "lines and sections of the immersed body."

"With the view of adapting the ship to a new mode of attack "and defence I give the fore body an excess of displacement "over that of the after body for the purpose of sustaining a "heavier weight of armour plating or other defensive armour "upon the upper cheeks of the bow or beak of the vessel. I "protect this portion of the ship with thicker metal than the "midships and after part of the hull. I carry back the surface "of the bow above the height of the greatest breadth, so that it "presents a surface similar in form and shape to the upper sur-"face of a ploughshare; shot or projectiles will thus be more "likely in striking it to glance off without taking effect. For a "line-of-battle ship I mount a range of broadside guns upon a "platform or deck, raised from six to eight feet above the water "line; these guns are pointed obliquely through the ship's side "*with their muzzles* directed forward. I prefer that there should

" not be any guns pointing from the bow or stern in this range, " and that they be confined strictly to the broadside of the ship, " that there may be no gun ports further forward than the turn " of the cheek of the bow.

"Above this gun deck or platform I build another deck, which " I call the main deck. At this main deck I have rails and " sheet iron upon suitable framing, constructed in lengths, parts, " or sections, for the purpose of protecting this deck, with the " view of affording the crew shelter when cruising. I adapt this " portion of the upper works of the ship for lowering or sliding " down the ship's side inboard by means of machinery or other- " wise.

"Upon the main deck I erect a dome-like iron structure heavily " armour plated, and continued fore and aft within a certain dis- " tance of the ends of the ship, and with a space at the sides " sufficient to allow of the working of the ship, the two ends " being rounded. I pierce this structure for guns at both sides, " which are to be pointed similarly to the lower range, having in " some cases a heavy gun at each end pointing fore and aft. " Before the ship goes into action the telescopic masts are housed, " nothing appearing above the dome excepting the pole of the " mainmast for signalizing, and the flagstaff at the taffrail. and " a little of the top of the smoke funnel (if she has any). When " in action her bow or beak is always presented to the enemy, " this being the position of the greatest security against any fire " from the enemy's batteries, or from a ramming attack. When " fire has to be delivered by the guns of the broadside and dome " battery I use double propellers upon the double after ends, and, " by preference, of the construction described in the Specification " of my Patent, dated 20th May 1862, No. 1527. A tractive " force and a pushing force simultaneously exerted by the " propellers move the ship's head a little aside, which is gradually " changed and noted by the gunner's officer. Upon the guns " pointing to the object of attack fire is delivered, and simul- " taneously the tractive motion and pushing motion are reversed, " and the ship's head is brought back again through an arc of a " circle, say, a quadrant of a circle; the guns of the opposite side " by the time the ship's head has passed through this part of the " circle, the muzzles pointing out of the opposite broadside, and " those pointing from the opposite side of the dome battery bear " *upon the object of* attack, when fire is again delivered from the

" whole broadside batteries. While this mode of attack may be " maintained, and so long as the ship may not be flanked by " other ships of the enemy, she may possess a positive advantage " over the enemy's ship, so far as the other ship may not be " adapted for this manœuvre, and the extent she may deviate in " her tactics from that laid down. If this mode of attack and " defence were adhered to it would be impossible for two ships " to do each other material damage for a length of time if both " were equally matched in respect of all the improvements " herein-before described, and were also equal in point of size, " weight of metal, and other respects. Indeed, a very small " vessel might in this manner attack and destroy a very large ship, " because so long as her bow could be kept pointing to the " other, the large ship could do her no injury, but, on the other " hand, the small vessel has the opportunity of delivering the " whole of her battery right into the enemy's broadside without it " being necessary for any other than a very slippery target to be " presented for the enemy's return fire."

"Iron or other vessels of the ordinary single-ended construc- " tion, having great proportionate length and narrow beam," may be transformed "into double-ended ships, by cutting them " into two parts vertically and longitudinally along the centre " line, and removing the two sides of the vessel, after the " division," "at any convenient or necessary distance apart, and " by applying the lines and curves herein-before described, the " two halves of the ship" are "again joined and become a double- " ruddered vessel."

"The double rudders" referred to are placed "one under each " quarter, and upon the double after ends, placed inside the pro- " peller or before it and above the propeller shaft, say, between it " and the loaded line, the rudder shafts being carried up and " worked either together or independently of each other, its " broadest part being at the loaded water line, and its narrowest " part at the lower portion next the shaft of propeller."

The inventor claims, in connexion with these improvements, " the principle of taking away displacement or lifting power from " the vicinity of and under the longitudinal centre of the bottom " of ships, and of removing the same in the direction of and near " to the 'broadside' of the body, say, immediately under what " are herein-before termed the 'outer ventral curves,' thus creat- " *ing the maximum* stability with the maximum extreme breadth

" with the object of diminishing the injurious tendencies of the
" vessel to 'roll' and 'careen,' and of doing away with those
" uneasy and dangerous lateral motions which are experienced in
" the case of vessels with great beam, very fine bottoms, having
" considerable weights placed low down in the hold; and also of
" hollowing the longitudinal midship bodies towards the ends of
" the vessel, which, whilst it will offer the utmost freedom for the
" fluid to pass along the bottom, will also confine it in such a
" manner that it cannot slip from under the ship's body at those
" parts towards the extremity in a dipping motion, but which
" will offer a solid resistance to the descent of the extremities,
" and in that way ease the longitudinal oscillations of the vessel,
" and which motions are herein-before termed 'pitching' and
" 'scending, and which will also render impossible the dangerous
" tendency of the vessel to 'poop' or bury her head under water."
The inventor also describes improvements in masts and sails.

[Printed, 3s. Drawings.]

A.D. 1863, October 30.—N° 2680.

GISBORNE, Frederic Newton.—"An improved compo-
" sition for coating ships' bottoms." "I use in the composition
" the following ingredients or their chemical equivalents, and in
" the proportions following, or nearly so, but the relative quan-
" tities may be varied more or less.

"Quicksilver, as a nitrate of silver or crude, but I prefer the
" latter, one pound; red lead, half a pound; litharge, half a
" pound; powdered flint glass, or asphalt, a quarter of a pound;
" vermilion or Chinese red, a quarter of a pound, mixed together
" as a pigment with boiled linseed oil.

"The process of admixture I adopt is as follows, or nearly
" so:—I pour a little oil on the quicksilver and rub it down for
" a few minutes, then gradually add the powdered glass or
" asphalt to aid the disintegration of the globules of the quick-
" silver. I mix the red lead and litharge dry first, and then
" add them to the quicksilver so prepared; I then add the
" vermilion or Chinese red, with sufficient additional oil to form
" a composition about the ordinary consistency of paint or
" pigment prepared for use. The composition is applied in the
" usual way with two coatings, but the surface to which it is
" applied should be clean.

"The quicksilver is the essential ingredient in the com-"position."

[Printed, 4d. No Drawings.]

A.D. 1863, October 30.—N° 2688. (* *)

ROSSELET, George.—(*Provisional protection only.*)—"Im-"provements in apparatus for sustaining and raising ships or "vessels, applicable also as life buoys."

These improvements are thus defined:—

"My invention consists in the employment of the trunk and of "conically shaped vessels (by preference made of metal) closed "at their smaller ends, and terminating at the other in different "ways as hereafter described, according to the purposes for "which they are required to be used. These vessels are stowed "away when not in use one within the other, so as to occupy as "little space as possible.

"First, according to one arrangement the mouths of the vessels "are fitted with bands of some elastic material to form a hermetic "joint; when two vessels are placed with their large ends to-"gether they will be then full of air and water-tight. By placing "a sufficient number of these vessels thus closed under the deck "of a ship she could not sink, whatever apertures there may be to "admit water into her hold.

"Secondly, according to another arrangement the mouths of the "vessels are provided with some water-proof material occupying "the whole length of the vessel, with a second metal bottom "having an aperture in it closed by a slide, which when open "admits air and expands the material fitted inside; rods, by "preference three, keep this second bottom at the desired dis-"tance from the entrance or opening of the metal conical vessel; "they may be used as those before described.

"Third, the conical vessels before described may with advan-"tage be attached to landing stages to prevent their being "submerged.

"Fourth, when the conical vessels are employed for raising a "sunken ship the double metal conical vessels filled with im-"permeable material are employed, and for this purpose the "vessels which have rings at bottom are attached to the sunken "ship. The moveable bottom is provided with a pipe in com-"munication with the atmosphere and in such manner that after

" being placed in the water (the vessels being closed) they may " be opened to admit air, and when full the buoyancy of the " vessels will raise the sunken ship."

" Fifth, a ship is often of necessity abandoned at sea. In order " to mark the place she occupies I fit on the deck a floating buoy " the lower end of which is attached to a cord or rope wound on " a bobbin or reel, in such manner that this cord will unwind as " the ship sinks, and in order that the buoy may be easily seen it " carries a series of by preference crossed levers thus X which " are laid on the deck under ordinary circumstances, but when " the buoy is afloat they open. The upper part of these levers " carry flags which rise above the surface of the water sufficiently " to be seen at a considerable distance, and thus enable the " position of the lost or sunken ship to be with comparative " facility ascertained."

" Sixth, the conical vessels before described are also used as " life buoys."

[Printed, 4d. No Drawings.]

A.D. 1863, October 30.—N° 2690.

RUSS, Barnabas.—" Improvements in the construction of iron " and other ships, vessels, and batteries of war, and of cupolas " and armour plates applicable thereto, parts of which improve- " ments are also applicable to other useful purposes." This invention consists " of improvements in the method of constructing " iron and other ships or vessels, and of batteries of war, with " reference to their framework generally, their hulls and iron- " plating, bulkheads, hatchways, look-outs, port-holes, masts, " yards, bowsprits, and booms, funnels and steam pipes, to cu- " polas, to armour-plates, and to screws, bolts, and washers, to " compositions applicable to the preservation and strengthening " of some of these constructions, parts of the improvements being " likewise applicable to other useful purposes."

The inventor claims the principle of applying iron plates " doubly, so as to form their own laps or joints, and so that one " joint will not come in line with another, producing a smooth " or flush surface for internal and external plating for hulls, for " vertical or longitudinal frames or ribs, for keels, stems and " stern posts, decks, beams, bulkheads, bulwarks, masts, bow-

" sprits, funnels, cupolas, cylinders, or tubular, oval, or other " forms."

" The vessel may be constructed with longitudinal plates lying " horizontally, with angle irons rivetted on the top side of each " plate; the angle irons will be rivetted to the internal surfaces " of the plates forming the hull of the vessel, about fifteen " inches apart. These plates will be about twelve inches in " width, and about three-fourths of an inch in thickness; the " distance between the external and internal plating will be " about 15 inches, and the vertical frames or ribs will be on the " internal sides of the hull plates, and will be rivetted thereto; " and in the chambers between these plates there will be about " 15 inches thickness of teak, oak, or other wood or ebonite in " two sections of about 7½ inches each," or they will be filled by a composition composed of pitch, tar, resin, asphalte, &c. The whole structure will be through-bolted together. If armour plated, iron tubes will be previously inserted through the chambers between the frames or ribs, for the bolts, which are screwed, to pass through, unless wood packing is used, when no tubes will be required.

" The vessel may be constructed with longitudinal frames, ribs, " or stringers lying horizontally, and rivetted alternately to the " internal plating of the external skin, and to the external plat- " ing of the interior skin." The plates are worked in two thicknesses, so as to break joint, and form laps or flanges of about eight inches in width. " The double plating to form the external " and internal skins of the vessel may be strengthened or held " together as follows:—The internal surface of the external plat- " ing is to have vertical frames or stringers rivetted thereto at " distances of about two feet apart by means of angle iron on " each side of the frames. If the space between the skin is 15 " inches, these vertical frames or ribs should be about 7 inches in " width, 6 in depth, and ¾ of an inch thick. Then the exter- " nal surface of the internal skin is to have horizontal or longi- " tudinal frames, stringers, or ribs similarly rivetted thereto at " the same distances apart; and the width of these ribs is to be " about 6 inches, so that these double series of stringers will not " meet together or touch each other, but a space of about two " inches clear will remain between their edges, the two skins will " be secured together by means of intermediate screw bolts, and " the armour-plate bolts will further strengthen the construction."

The principle of double-plating is also applicable to the construction of vessels made with one skin with internal ribs. Such plating may be coated with preservative composition, and then covered with copper or composition plates, or with sheathing. "The beams will be wrought-iron plates put together doubly, on "my principle, with angle irons rivetted thereto, or they may be "made with single plates, in which case a fish-plate would be "required to make each joint firm."

Portable bulwarks are described made of hinged standards with wire ropes and canvas.

It is proposed also to apply hydraulic or other suitable mechanical power to lower and raise the hatchways. "The lower "part of the hatchway is formed with a rebate or flange, and the "deck is cut to correspond therewith; the upper surface of the "rebate or protection is furnished with a packing, so that when "the hatchway is forced up to its closed position a watertight "joint will be made." The hatchway is to rest on tubes surrounding the stanchions, and these tubes are to be operated on by the hydraulic or other power, or the power may be applied to the stanchions themselves. By means of the arrangements provided for raising and lowering, every object required to be taken on deck or removed therefrom could easily be controlled; cannon and all weighty articles could be raised and lowered with facility.

The port-holes will be constructed with doors or flaps to open in one or two halves instantaneously, by means of hinges or blind joints worked by male or female screws, pins, barrel nuts, and wheels, plummer blocks and bolts, and levers and chains; or they may be constructed so that no doors or flaps will be required. "In such cases I employ a tube or socket with a flange or plate "on the external and internal end, and on the external side there "will be a thread cut or wound thereon as far as may be required "to receive a nut and a washer to screw the flange on the end of "the tube or socket against the external side of the vessel. In "the interior of the tube or socket there will be a thread cut from "the flange on the external end or side through to the internal "end or side, and a plug with an external thread will be made to "fit the thread in the socket. At the internal end of the tube "there will be a stop-socket nut, or plug, with an external thread "cut thereon to fit the thread in the tube. The stop-socket nut "will be worked by a lever. bar and pin, and a stop pin and ball. "The screwed *plug forming* the stop at the internal end will pass

"in or out at the external and internal end, so that the screwed "plug can pass through as required by unscrewing the stop-"socket nut or plug; the port-hole will prove a total resistance "against shot or shell."

"For land, sea, or floating constructions for attack and defence, "I construct lifting, rising, and falling batteries, either stationary "or on ships or gun-boats, by elevating and lowering from the "hold in vessels the decks containing the rows of guns," by means of a suitable number of hydraulic rams. "The lifting, "rising, and falling deck must form a water-tight joint against "the internal surface of the hulls. Separate sections of the deck "may be raised and lowered by these means, so as to leave spaces "for the situation of the masts, beams, and bulkheads, or divi-"sions containing the engines and boilers."

"I construct bolts applicable to my invention for securing "armour plates, and also for other useful purposes, as follows:— "I form the head of the bolt of a conical or taper form with "regard to the cylindrical portion, and I commence the taper at "such distance from the extremity of the head as to allow of the "taper extending inwardly to the cylindrical portion for a short "distance beyond the back of the armour plate, in order that the "longitudinal strain shall not commence at the point where the "taper runs into the cylinder." The ends of such bolts are increased in thickness to receive the screw.

"Another method is to commence the taper at a point much "nearer the head of the bolt, and when the taper has reached its "largest diameter I continue such limit in a cylindrical form to "the extreme head of the bolt."

"Another method is to commence the taper at any desired part "of the cylinder, continuing it some distance, and then forming a "short portion cylindrical, and again commencing the taper to the "final cylindrical head, as last described; or the bolt may be "formed with a taper head, and a perfectly cylindrical continua-"tion to the screw thread, the depth of which is to be cut only "down to the extent of the periphery of the cylindrical portion, "whereby the initial of fracture will be removed from the last "thread of the screw, and the strain will be borne by the entire "length of the bolt. I apply these bolts to the purpose of attach-"ing my armour plates to the sides of vessels or batteries as "follows:—I cut a toad hole in the armour plate equal in area to "that of the head of the bolt, and in depth to the length of its

" taper; below this recess or hole another recess is cut of the size " of the bolt head, which is first to be inserted into the toad hole, " and then dropped into the lower recess, after which a toad piece " is to be fitted into the toad hole, and secured by two screws " entering threads cut one half in the sides of the toad piece, and " the other half circle of threads cut in the sides of the armour " plate. The screws will thus work in these threads, and secure " the toad piece in the armour plate.

" To adapt screw bolts made on my principle to woodwork, I " form a nick or notch in the head, as in ordinary screws, or a " square or angular head to be turned by a spanner or wrench." " The hole should be bored to a few inches in depth to receive the " enlarged cylindrical or taper part of the bolt; after which the " bore is to continue of the diameter of the reduced cylindrical " portion; the screw is then inserted and turned for the thread to " cut its way, and the cylindrical part of the bolt will then follow " without resistance, the enlarged taper under the head ultimately " fitting the external or enlarged bore, and steadying or lightening " the screw and causing no back wood.

" I make washers for my constructions and for other useful " purposes in the following manner:—I form a disc of iron or " other convenient metal with a flange on one side around the " entire periphery. This flange is to be of any depth according " to the substance of washer required. The central portion of " the disc or plate is perforated with a circular opening of suf- " ficient diameter to admit of the passage of the screwed or " threaded end of a screw bolt. On the internal surface of the " washer, within the flange, I place a corresponding disc or sheet " of india-rubber, vulcanized or simple, or of gutta percha, lead, " or other yielding or elastic material," and over this a metallic washer; or there may be several discs and washers within the flanged disc. The disc may be flanged and filled with elastic material on both sides, if desired.

" I propose to construct ladders, applicable to vessels or other- " wise, of galvanized iron wire in strands, twisted or plaited to " form a wire rope. The rungs are to be made of rod iron, with " a tube around each." Ladders made by these methods may be either rolled around a drum or folded up in lengths by hinges. Chains may be applied in lieu of the wire rope or bars, if preferred."

The inventor proposes also to use lead packing between the armour plates and the hulls, in order to effect a tight and com-

pact fitting or bedding of the plates when screwed up. The inventor coats armour or other iron plates with copper or with other metals or alloys, by heating the metals and causing them to run into a fluid or molten state by aid of borax or other suitable flux. He then heats the plates, which must be prepared with a clean surface, to a temperature of about 200 degrees, and dips them into the molten metal or alloy.

Instead of double-iron plating for the bottom of a ship, the inventor proposes to have either one thickness of iron and one of copper, or an alloy of copper; or two equal thicknesses of iron and one of copper or copper alloy; this latter metal being in each case equal in thickness to one-third of the whole combination. It is also to be coated internally with tin, or lead and tin combined. The rivets should be made of a similar metal or composition to the outer plating, and the plates should all be flush-jointed, forming covering straps to each other. "I apply to or between iron plates "and to the copper or compound plates forming the hull of the "vessel, a liquid composition to prevent corrosion or electrical "action. The composition will be composed of plumbago in "about 20 parts, white or red oxide of lead, or litharge, or patent "dryers, about 1 part, and turpentine about 3 parts, by weight, "with sufficient varnish to promote adhesion of the other ma-"terials;" or naphtha may be substituted for the varnish and turpentine.

"To preserve the bottoms of iron vessels or batteries from decay "by the action of sea water, I coat them with an adhesive solution "or varnish, such as marine glue mixed with plumbago, red and "white oxide of lead, and litharge, or patent dryers, and turpen-"tine, or coal or wood naptha; and while such coating is still moist, "I apply to its surface pulverized glass, pulverized copper, or the "native mineral pulverized, or mineral lead in a finely powdered "state."

The inventor also describes improvements in masts and other spars; in the manufacture of armour plates; in the construction of cupolas; in the machinery for raising and lowering cupolas, and for turning them; also in the construction of forts with cupolas, which are to be floated to shallow water and sunk there, to remain as permanent forts; and he claims generally the methods of constructing the hulls and other parts of ships, vessels, and batteries, with special reference to the iron plating, frames, *ribs, or stringers,* beams, bulkheads, decks, bulwarks, and hatch-

ways; also the masts, bowsprits, and booms; funnels and steam-pipes; cylindrical and tubular forms and look-outs; the application of oak, teak, ebonite, and composition between the skins of vessels, cupolas, and batteries, or concrete for stationary batteries; the construction of port holes, bolts, and screws, washers, and ladders; the construction of the cupolas, whether stationary, rising and falling, rotating or oscillating; the manufacture and annealing of armour plates, the frames and composition for the approaches to batteries, and their applications; the manufacture and application of the lead packing; of the compositions for preventing corrosion and electrical action; the copper or composition, or alloy, and other applications of plating on iron plates; the application of tin to copper or composition plates; the compositions with pulverized glass and other substances, and their applications; the constructions of land, sea, and floating batteries; together with the general improvements specified, appertaining to the purposes of the invention.

[Printed, 1*s*. 10*d*. No Drawings.]

A.D. 1863, October 31.—N° 2703.

GETTY, JOHN.—(*Provisional protection only.*)—" Improvements " in building ships and vessels." " In constructing ships and " vessels with iron ribs or framing, and planking the same with " wood, it is found that oak and other timber acts injuriously " on the iron, and the present invention consists in the intro- " duction of sheet lead between the iron ribs or framing and the " wood planking, and it is desirable in so doing to have the " sheet lead wider than the ribs and framings, and to turn up " the edges of the lead against or over the sides of the angle-iron " ribs or framing."

[Printed, 4*d*. No Drawings.]

A.D. 1863, November 4.—N° 2732.

MAW, JOHN HORNBY.—" Improvements in the application of " preservative coatings or compositions to the bottoms of ships " and vessels." This invention consists in the following means of giving increased permanency to protective compositions or matters when applied to the surfaces of ships or vessels :—

" I cover such surfaces with indentations, grooves, or other " hollows for the reception and firm retention of the compo-

" sitions." "I make the said indentations or hollows sufficiently " close to each other to give increased holding to that part of the " protective matter which is on the spaces between the holes, and " also sufficiently close to each other that even in case of the said " matter being rubbed off or removed from the spaces between " the holes or indentations there is no sufficient interval or in- " terstice to which " marine animals " can attach themselves so " as to grow into serious impediments, because the repellant " matter will not be removed from the holes by what might " remove it from the spaces between them. The holes being " filled, the ship or vessel will present a smooth surface to the " water.

" I prepare the surfaces by punching or chiselling, or after the " manner of file cutting, or by pressure, whilst hot or when cold, " or by means of the planing machine, or any other means," and either before or after the plates are made up into the structure of the ship.

[Printed, 4*d*. No Drawings.]

A.D. 1863, November 5.—N° 2749.

SICKELS, FREDERICK ELSWORTH.—"An improved mode of " and apparatus for steering and turning vessels." The improvements consist in providing for some of the various exigencies that arise in practice " when using mechanical power to operate a " rudder on vessels of various descriptions and in different situa- " tions, and the circumstances of each case must determine the " adoption of so much of the improvements below referred to as " are best adapted to it."

1. " When operating the rudder or rudders by power, I use a " supplementary engine for reversing the action of the propelling " engines on the propellers, and by producing a sympathetic " action of the rudder or rudders." " I bring the currents " created both by forward and backing motions of the propelling " engines upon one and the same side of the rudder or rudders " (which side for the time being the effective side of the rudder), " and thus I turn or revolve the vessel to port or starboard, " according to the position to which the rudder is shifted, as the " propelling engines are reversed, without propelling it ahead or " astern beyond the required position;" " for instance, to revolve " *the vessel to port*, the rudder should be rapidly turned to port

"with the aid of the steering engines, and the propelling engines "started ahead. As soon as the vessel moves ahead the links" of the propelling engines "should be moved with the supplementary "engine so as to rapidly reverse the propelling engines and the "rudder slowly moved to starboard, then as the vessel starts to "go back the links should be again shifted to quickly cause the "propelling engines to go ahead, and the rudder should be "rapidly turned to port, and these operations should be repeated "to cause the vessel to revolve to port."

2. "In connection with the propelling engines is an indicator, "which is placed conveniently for the steersman. The indicator "may consist of a floating hand driven to and fro and main-"tained in any required position by a current of air driven by "the propelling engines, its object being to indicate to the steers-"man the position into which the rudder is to be shifted accord-"ing as the direction of the indicator of the propeller is shifted "to turn the vessel. One end only of this hand is visible at a "time to the steersman, that which is to be seen being determined "by the direction the vessel is required to be turned. An indi-"cator operated by the rudder is placed close to this engine "indicator, shewing the position and motion of the rudder, and "by the steersman causing this indicator to follow the indications "of the engine the vessel will be turned round either to port or "starboard, as required; there will thus be removed from the "steersman the responsibility of judging of the position the "rudder is to take with respect to the currents created by "reversing the action of the propellers. The rudder is to be "moved quickly in the direction it is desired to turn the bow of "the vessel, and slowly in the opposite direction, and the direc-"tions exposed to view on the dial should correspond accordingly. "In connection with the above improvements I use a separate "telegraph apparatus to convey the orders to the engineer and "steersman respecting the operations of the rudder and the "engines when employed to revolve the ship."

3. "I combine an extension rudder with an engine to operate "the rudder by power, and am thus enabled to adapt the size of "the rudder to the power that is applied to it, according to the "rapidity with which it is required to turn the vessel. The "extension rudder may be of any of the known modes of con-"struction, and its adjustment may be effected from within the

" vessel, or a piece may be shipped on the rudder and hoisted on " board when not used."

4. " I propose to construct rudders with swinging leaves or " shutters which will feather in turning in one direction, the " rudder when moving back acting as a propeller to turn the " vessel: The feathering leaves or shutters are capable of being " arrested, so as to propel in either direction as required, stops " that are adjustable from inside or outside of the ship being " used for that purpose. The feathering leaves may also be " locked to allow of the rudder acting as an ordinary rudder, or " the whole or part of the feathering leaves or shutters may be " liberated, so as to move freely in either direction, and then in " heavy weather they will yield to the blows of the sea, or they " may be taken on board when not required for use. The " feathering shutters may be made on a frame to ship and unship " from the rudder. The stops may act on elastic pads to avoid " jar in arresting the feathering pieces."

5. " I propose to convert a solid ship's rudder into a recipro- " cating propeller for turning the vessel by imparting a motion " thereto by motive power, the rudder being moved slowly in one " direction and fast in the other. When, however, the feathering " shutters are applied to the rudder it may be worked with like " speed in either direction. One or more rudders can be used, " and they may be located to suit the requirements and the con- " struction of the vessel on which they may be placed. The " motive power for operating the rudder may be a special power " engine that reverses its valves to reciprocate the rudder, or one " that revolves continuously in one direction with a crank or " cam motion to reciprocate the rudder, or the rudder may be " operated by the ordinary propelling engines."

6. " On the rudder post I fit a loose collar, which also fits the " opening in the stern. By removing this collar the rudder is " easily unshipped, while the collar when in place makes a tight " joint to exclude the water."

7. " The rudder chain or rope I guide in a curve struck from " the rudder post, so as take up the slack and preserve the lever- " age when the rudder is hard over either way. The extremity of " the tiller arm I bend downwards, so as to lead down to the " steering gear."

8. " To keep the steersman from moving the rudder too far

" either way when working the valve motion by hand, I put a
" stop on the valve motion."

9. " An indicator from the rudder I place conveniently for the " engineer, so that he can see the position and motion of the " rudder while working the engines to revolve the ship, and an " indicator from the reversing gear is conveniently placed for the " steersman to notify him when the propelling engines are about " to be reversed."

10. " As a novel form of extension rudder I suspend an exten- " sion piece upon a joint on the rudder, and secure it by a catch " that is operated by a rod or string, thus keeping it from falling " outwards by the action of gravity. The same catch on the " rudder will also hold the turning or extension piece in when " it is drawn towards the vessel. This catch acts in different " notches to hold the shifting piece as required."

11. " To bring the rudder amidships I cause a weight or spring " to act on the valve motion when it is liberated from the control " of the steersman."

12. " I employ a hand-steering arrangement to operate through " a friction break, so that in operating a large rudder that is " calculated for power steering the wheelman may be safe from " the effects of the blows of the sea."

13. " When I use a special engine to work the rudder as above " described I cause it also to shift the reversing gear of the pro- " pelling engines in order to turn the ship. The propelling engines " should be provided with ample relief valves to avoid compressing " the steam when suddenly reversing the engines."

14. " The propeller blades I propose to make of what is known " in trade and commerce as vulcanite, so as to reduce the weight " and increase the elasticity of the blades, thus securing at the " same time less liability to break from sudden application of " force, and less resistance when the propelling engines are " suddenly reversed. The vulcanite blades are to be strengthened " by metal plates connected to the hub of the propeller and " extending towards the extreme diameter."

15. " Rudders I also propose to make partially of vulcanite " with a metal rudder stock; the vulcanite yielding to the pres- " sure of the water when an excessive strain is applied will act " as a means of safety to the steering apparatus. The rudder " will also be lighter than if made entirely of metal."

16. "When the propelling engines are used to operate the "rudder, and the steering gear is not strong enough to resist the "whole power that may be then brought upon the rudder, I place "between it and the rudder a friction connection, so that only so "much power can be applied to the rudder as this friction con- "nection will transmit without slipping, and the force with which "this rudder can be operated by the propelling engines can be "adjusted by tightening or loosening the friction. A belt may be "thus used to transmit the power to the rudder or friction sur- "faces in direct contact, or an elastic connection may be inter- "posed between the engine and rudder, so as by its yielding to "prevent any excessive strain being applied to the rudder."

"It will be convenient to have the hand-steering apparatus, "the separate steering engine above mentioned, and the propel- "ling engines to connect and disconnect from the rudder or "rudders at pleasure, so that either may be used or thrown out "of gear as circumstances may require."

[Printed, 6s. 4*d*. Drawings.]

A.D. 1863, November 6.—N° 2756.

SAUNDERS, Robert.—(*Provisional protection only.*)—" Im- "provements in fastening together the parts of ships and vessels, "and in respect to the more efficient caulking of the seams "thereof." This invention consists "in securing the planking, "whether for bottoms, sides, or decks and other parts of ships "and vessels, whether constructed of iron or of wood, to the beams "or other analogous portions or framing thereof, which I effect "by means of what I term T or half T-headed screws screwed "in alongside the said beams or analogous parts or framing, and "so that the heads of the said screws shall project over portions "of the surfaces of the beams or framing, thus firmly securing "the parts of ships and vessels together. For caulking I would "make grooves in the edges of the planking, or introduce metal "to form what may be termed a holding surface in the seam, in "place of the smooth surface as at present in the seams of "planking or decks."

[Printed, 4*d*. No Drawings.]

A.D. 1863, November 9.—N° 2783.

BOUSFIELD, GEORGE TOMLINSON.—(*A communication from William Keld Whytehead.*)—" Improvements in the construction " of ships and vessels." " This invention relates to the construc- " tion of ships and vessels composed partly of wood and partly " of iron, and the improvement consists in so constructing such " ships and vessels that while the ironwork is defended from " contact with the water by a covering of wood the whole of the " parts are accessible for cleaning, painting, and repairs."

" In iron vessels as usually constructed an outer skin of iron " plate is fastened to ribs and floors of iron, and to these ribs and " floors an inner skin of wood is fastened. In this improved " system this arrangement is reversed, that is, a vessel is con- " structed with an outer skin of wood and an inner skin of iron, " both skins being made water-tight, and being separated a suffi- " cient distance the one from the other by iron ribs and floors to " allow of a workman passing between the skins. The wood " planking may be applied in one or more thicknesses longitu- " dinally or diagonally, as is well understood by ship builders. " There is a man-hole in every space on each side of the keel. " Provision is made in each man-hole door to attach a pump to " clear out any leakage through the wooden skin."

[Printed, 10*d*. Drawing.]

A.D. 1863, November 11.—N° 2807.

STAINTON, MATTHEW, and LAWSON, DANIEL. — (*Provisional protection only.*)—" Improvements in apparatus for steer- " ing ships and vessels." This invention has for its object improvements in apparatus for steering ships and vessels. " For " this purpose we employ a steering wheel, on the axis of which " is a drum. A rope takes several turns around this drum, and " passes away on either side of the drum to and around a guide " pulley, each end of the rope is then led to a barrel placed in " between the guide pullies, it takes a half-turn around this barrel " and then returns and is made fast. The barrel is held between " suitable guides passing across the stern of the ship or vessel " from one of the guide pullies to the other, and when the " steering wheel is turned the barrel is caused to traverse in one " or other direction along its guides, and it revolves at the same

" time. The barrel is fitted with an axis projecting up from it, " and this passes through a slot in the tiller secured on the rudder " head, or a swivelling fork may be connected to the top of the " barrel, and this may be made to embrace the tiller, a prong " passing on either side of it; thus, in either case, the barrel as " it traverses takes the tiller with it. By making the con- " nection between the tiller and the barrel in this manner, the " rudder and the tiller can rise clear of the apparatus without " deranging it; but for this provision the steering apparatus " would be very liable to be injured, should the ship or vessel at " any time touch the ground. The barrel may, if desired, be made " with spur teeth upon it, and these may be made to gear with " rack teeth on the guide, or a case or frame may be used instead " of the barrel having two sheaves placed in it, their flanges " being so extended as to come in contact with the guide plates, " and so have a rolling motion similar to the barrel; a pin is " fixed in the centre of this frame to project through the tiller " in the same way as the axis in the barrel does in the arrangement " first described."

[Printed, 4d. No Drawings.]

A.D. 1863, November 14.—N° 2847.

ELLISSEN, Adolf.—" Improvements in preventing the fouling " of the bottoms and sides of ships and vessels, particularly " applicable to ships and vessels constructed of or sheathed with " iron." " I use a composition of oil and oleaginous substance " combined with poisonous or life-destroying substance, such, for " instance, as arsenic; or oil or oleaginous substance alone. And " in order to apply the composition or substance to the ship or " vessel, I use also a reservoir placed in any convenient part of " the vessel, or if hollow iron masts be used they may contain " the composition or oil or oleaginous substance, and a pipe or " conduit pipes, or conduits perforated with small holes may be " carried along the bottom and sides of the vessel in any required " position, so that the composition or oil may ooze out of, be " expressed, or exude from the apertures of the perforated pipe " or pipes, and thence ascend and keep the sides and bottom sup- " plied with the composition or oil or oleaginous matter, so as to " effectually prevent the adhesion of barnacles and other marine " animals or plants, or destroy them if attacking the vessel.

" Before leaving the dry dock I would oil or grease the sides and " bottom of the vessel in order to prepare the surface the more " readily to take up the composition, oil, or oleaginous substance " as aforesaid. When applied to wooden ships iron sheathing " could be used with the arrangements before described, thereby " superseding the use of copper or other expensive sheathings. " The oil or oleaginous matters may however be caused to " circulate through the pipes by the arrangements" " described, " by hydraulic pumping arrangements, or any other arrangements, " that may be deemed desirable.

[Printed, 10d. Drawing.]

A.D. 1863, November 14.—N° 2848.

PRIDEAUX, Thomas Symes.—" Improvements in the con- " struction of armour for ships of war and land batteries." " I " enclose the armour plate in a waterproof covering for its preser- " vation, and when space will permit, I cover its outer face with " a layer of plaited hemp, (or hair, or wool, or other equivalent " material possessing the requisite elasticity and tenacity, made " up of a succession of thin layers,) to receive the first impact of " the projectile, so that the plate may be deprived of its vis inertiæ, " and put in motion before its actual contact with the projectile. " When space will not admit of this appliance being used, I " prefer the face of the armour plate to be made with a number " of salient points or ridges. By the use of wooden backing, " and a moderately thin armour plate, the requisite stiffness and " strength to prevent buckling or penetration may be obtained " with a less weight than when iron alone is used, but greater " thickness of material, and consequently more space will be " necessary in the former case. When this cannot be afforded, " the extra thick armour plate required should have its outer por- " tion of soft iron, and its inner portion of steel. When I use " backing I employ a cellular structure of iron or steel, consisting " of a series of hexagonal cells like a honeycomb, each cell being " filled with a hexagonal plug of compressed wood, or any fibrous " material, such as hemp, or cocoa-nut fibre, compressed to the " size and shape of the cell in a mould. The sides of the cells " should be from $\frac{1}{10}$ to $\frac{1}{20}$ the thickness of the armour plate, and " the bottom twice or thrice the thickness of the sides. Their

" depth should be about three or four times the thickness of the
" armour plate, and their diameter about $\frac{2}{3}$ or $\frac{3}{4}$ of their depth.
" The honeycomb structure may be made of malleable cast iron,
" or cast in soft steel, and annealed, or constructed of wrought
" iron by bending stringers of this metal so as to form a
" series of equidistant angles of 120°, and then rivetting them
" together by connecting pieces, and employing a separate plate
" for the bottom or back, which in this case should be propor-
" tionately thicker; but I prefer to construct a cellular network
" by casting when the sides of the cells are thick enough to admit
" of doing so. As a substitute for the difficulty of manufac-
" turing plates of a certain size, two, or even three plates may be
" united, so as to form one moveable target. Each armour plate
" (whether with or without wooden backing) is suspended by rods
" or cables, the upper ends of which are attached by pin joints
" to ribs or beams fitted with eyes or studs on the face of the
" battery to be protected, and the lower ends by pin joints to the
" lower portion of the inner side of the armour plate, which is
" also to be furnished with studs or eyes for the purpose. Thus
" freely suspended from a vertical face, and checked from turning
" over by the means hereafter to be described, it is evident the
" plate would by its own gravity tend to descend to the lowest
" attainable position, that is to say, would hang resting against
" the face from which it is suspended. Each armour plate is to be
" further secured to the face that supports it, and which it pro-
" tects by four or more flexible ties (which may either be iron
" chains, or hempen or other cables, I prefer cables or bands
" of vulcanized india-rubber,) affixed to eyes on the protected
" face on the one hand, and on the inner side of the armour
" plate or of the cellular backing on the other hand, which ties
" are to be of just such a length as to allow of the armour plate
" or target being drawn from the face of the battery the distance at
" which it is proposed to keep them apart. It is to be kept at this
" desired distance by the insertion between the two of vulcanized
" india-rubber, or other elastic material, such as wool, or hair, or
" steel springs, or blocks of vulcanized india-rubber may be used,
" and the spaces between fitted with cushions stuffed with elastic
" material. The flexible ties being kept slightly strained by the
" elastic blocks or cushions, the armour plate or target will be
" strongly and steadily though elastically fixed, so that when

" attached to vessels it will be capable of being subjected to all " the vicissitudes of a stormy sea without being liable to the " straining caused by jerking or shaking."

[Printed, 10d. Drawing.]

A.D. 1863, November 14.—N° 2854.

LEWIS, JOHN.—"Improvements in rudders." The invention consists "in wings or auxiliary rudders attached to the main rud- " der on each side thereof, whereby the rudder does not have to " be as broad as now usual, and there is less liability of its being " broken, and less power is required at the helm. I apply said " wings in such a manner that one wing will close against the " rudder by the action of the water on the side towards which the " rudder is moved, while the opposite wing acts to balance the " action by the water on the rudder, thereby relieving the helm " from strain."

The rudder is of any usual size or shape, and is attached to the stern post by any convenient means, and the rudder stock extends up into the vessel, and is actuated by any suitable helm or steering apparatus. The wings or blades are sustained by arms or braces extending from the sides of the rudder. These arms are inclined forward, and the wings at their ends are, when the rudder is straight, in advance of the rudder, in order that the surfaces exposed to the action of the water may be nearly equal all round the vertical axis or centre of motion of the rudder, so that the rudder may be held more easily in consequence of the action of the water being thus balanced. "The wing being in advance " of the rudder also prevents said wing acting in the eddy water " behind the rudder."

The arms or braces might be rigid, "I however prefer to have " them formed as joints at both ends, so that the wing can " swing with the moving end of said arms and come against the " side of the rudder." Chains may be attached to these wings and may pass up through or on the outside of the rudder stock, by drawing on which the wings will be brought up against the sides of the rudder, for their safety while lying in port, or among drift ice, &c. The ends of the braces or arms next the rudder may be attached by any suitable joints, but to facilitate repairs to the wings it is preferred that such joints be formed by rings, eyes, or hooks, at the ends of chains or ropes passing up through tubes

or grooves in the rudder, and the lower ends of such holes or grooves determine the point at which the rings stop, and on which the arms swing; or the said chains may pass beneath cross pieces or hooks, or through the rudder and up on the opposite side, and thereby retain the ends of the arms in position against the rudder. The arms themselves should be formed so as to present their narrowest edge to the passing water, and may be braced for strengthening them, and the said arms may be provided with slots to pass over hooks attached to the rudder.

The blade on the forward side of the rudder, when turned diagonally, will be closed down against the rudder itself by the action of the water on its outer side; and the other blade, by the action of the water against its inner side, will be moved out from the rudder and tend to turn the rudder itself into a still more diagonal position, thus relieving the helm of strain to a considerable extent, and at the same time acting in such a way as to turn the ship in the proper direction. The wings when applied to a rudder behind a propeller are to be of such a shape that they cannot come in contact with the propeller blades, and they may swing either downward or upward in closing, and, if desired, with wings folding upward against the rudder; chains attached to the vessel and to the upper end of the wings may sustain their weight when in a normal position.

It will be evident that two wings on each side might be used in place of one, and that the ropes or chains should lead to a device near the helmsman that can be worked by his foot, so as to slacken up the chains and allow the wings to open, or draw them in and close the wings against the sides of the rudder. Recesses may be made for such wings in the rudder, and a spring beneath each may be employed to move the wings out from such recess when the ropes are slackened. The wings may be fitted to open farther from the rudder at the bottom than at the top, if the upper arms are the shortest. If it is desired to move the wings out from the rudder, without their being elevated or depressed, as required for shallow water, the arms may be attached to the rudder on vertical hinges, so as to swing out horizontally and carry with their outer ends the said wings, which wings will swing open in this direction by the action of the water as soon as the rudder is moved diagonally to the vessel's length. "It will be evident "that when the wings are placed slightly forward of the rudder "*the steering* will be much easier, but these wings might be,

" opposite or to the rear of the rudder, if required, for the " particular vessel."

[Printed, 8*d*. Drawing.]

A.D. 1863, November 17.—N° 2880.

BETTELEY, JOSEPH.—" Improvements in sheathing ships and " other vessels." This invention consists " in sheathing ships " with copper or yellow metal sheets, the back surfaces of which " are coated with lead, tin, or zinc, or alloys of such metals.

" This system of sheathing is peculiarly applicable for sheath- " ing iron fastened ships and vessels, but may be also applied " to ships and vessels otherwise fastened, and also to ships " and vessels built of iron or partly of iron, the object being " to prevent the injurious action which ordinary sheathing has on " iron fastenings. There are various modes by which sheets of " copper and of yellow metal may be produced with their back " surfaces coated with lead, tin, or zinc, or with alloys of those " metals, but I prefer to prepare the sheathing, when carrying out " my invention, by coating such sheathing metals with tin, or " lead, or zinc, by first obtaining a thin coating of tin on the back " surfaces, as is well understood. It is not, however, at all times " necessary that such a thin coating should be first obtained, as " amongst other cases, when coating the back surfaces of such " sheathing metal with tin or with zinc by immersing the sheets " of sheathing metal in a bath of either of such fused coating " metals. It will, however, be found desirable thus to employ " a thin coating of tin before passing the sheets of sheathing " metal into a bath of the coating metal used. In order that " only one side of each sheet of the copper or of the yellow " sheathing metal shall be coated with the white metal, the front " or outer surface of each sheet is first well coated with chalk or " with blacklead, or other similar matter which will prevent the " melted metal adhering when the sheets of sheathing metal are " immersed in a bath of the white coating metal."

Sheets of like sheathing metal, coated on one surface (the back surface), may however be otherwise prepared and used in carrying out this invention.

" In nailing or fastening such sheets of sheathing metal on to a " ship's bottom I prefer that the edges thereof should not overlap, " *but that their edges* should butt against each other, a strip of

"the white metal being placed at the back of each of the butt "joints, and the stems of the nails, which are of copper or yellow "metal, are coated with the white metal. I sometimes apply at "the back of the sheets of metal woven fabric or fibrous material, "which is caused to adhere to the back of the sheathing plates "by means of a waterproof cement."

[Printed, 4*d*. No Drawings.]

A.D. 1863, November 18.—Nº 2889.

ELDER, JOHN.—"Improvements relating to floating and other "docks." The inner shell of the dock consists of a flat floor, with the lower portions of the sides inclined and the upper portions vertical. The space between the shells is divided by longitudinal and transverse water-tight bulkheads, whilst the whole is strengthened by diagonal bracing, and the bottom by transverse angle iron. Horizontal water-tight partitions are introduced along the sides, so that the upper parts of the sides may be used as permanent air spaces. The machinery for pumping the water out of the compartments, when raising the dock, may be arranged in the usual way, or instead of placing the boilers and engines at the tops of the sides they may be placed lower down, but they will in that case, be so walled in, that the only access to them will be from the top to avoid any risk of water entering them. In order to transport the dock to a distant station in a comparatively complete state, it is constructed and arranged so that it can be propelled as a ship by the wind or by steam power. With this view the ends are shaped with projecting centres gradually rounded into the sides, and more particularly into the bottom, so that the entire bottom becomes like that of a long, flat, parallel-sided boat, or whilst the inner shells of the sides are kept straight, the outer shells of the sides are slightly curved, to give the dock externally a better form for moving through the water. The dock bottom may be furnished with a keel and with a rudder, or there may be more than one keel and more than one rudder. Where there are two keels these may be conveniently placed beneath the main longitudinal bulkheads situated on opposite sides of the centre line. The keel or keels may be of flanged plates, or in a box form, and the latter case may be availed of for draining the compartments by carrying the pump suction pipes down into them. It is intended that the dock shall sail with its inside floor a few feet above the outside

water level, or in other words, shall be light, in order to require comparatively little propelling power; and in some cases when floated at such light draught, the ends above the floor may be open, the sea being thus allowed to wash through the dock. If preferred, the dock may be immersed to a greater depth, and the sides may be of uniform height from end to end, or about a third part may be made to slant down towards either end, and a wall made of a single shell, or as a hollow casing, may be formed across at each end of about the height of the reduced ends. The internal space of the dock may be decked over, if wished, at the level of the ends, or at a higher or lower level, and for the entire length, or only for a part or parts thereof. Various arrangements may be made for propelling the dock. It may be fitted with masts, spars, and canvas, more or less like an ordinary ship, there being a single line of masts along the centre, or two lines of masts disposed one against each inner side shell. The pumping machinery may be arranged for driving screws, paddles, or other propellers, for steering or propelling, or separate engines may be fitted for that purpose. The pumps may be used for steering or propelling by a jet action. The vertical sides of the dock may be made to act to a greater or less extent as sails, either alone or in concert with ordinary sails, when the wind is oblique to the course, by arranging the keel or keels in one or more pieces, so that it or they can be inclined to the sides. Such movable keels may be made to turn on vertical axes, or keel plates, or lee boards may be hinged to the bottom, or they may be otherwise mounted on horizontal axes in different oblique positions, but so as to be inactive when folded up horizontally. The folding keel plates can be adjusted by chains passing up through pipes, whilst the swivelling keels may be adjusted by means of chains applied to their outer ends and suitably guided. It is proposed in some cases to fit the floating dock with sufficient propelling power to enable it to accompany war ships, so as to be at hand in case of damage to such ships when in action. It is also proposed in some cases to employ the floating dock for raising wrecks, and for getting them away from a dangerous shore, and with this view the dock will be furnished with steam windlasses, capstans, or other powerful hauling apparatus, to use in concert with or separately from the buoyant power the dock is capable of exerting by means of the pumps. It may in some cases be desirable to retain permanently the arrangements for transporting the dock from place to place, in which cases the

keel or keels may be arranged to be easily detached and resumed to permit of the dock being sunk in a shallow locality. When the dock is designed for use in situations liable to a rough sea, it is, by preference, constructed with one end enclosed, and with dock gates or floating caissons fitted to the other end, so that when a ship is received into it the water may be pumped out of the interior of the dock instead of being removed from the compartments, and the dock may be kept depressed by retaining or putting sufficient water in the compartments. The steadiness of the dock may be increased, where the depth of water at the station permits of it, by extending the vertical sides of the dock as far as is conveniently practicable below what is considered necessary in ordinary cases.

The improved keel block, applicable to floating and other docks, rests upon powerful springs of rubber (or metal), protected by a casing or cylinder from the action of the water. The rise of the block is limited by a bolt, the springs being compressed so as to bear up against the flange or head of the bolt with considerable pressure, and when the weight or pressure on any block of the series exceeds the force with which the block is pressed up against the bolt head by the springs, the springs become more compressed and the block sinks so as to allow the ship to bear more on the adjacent blocks.

A modification may be used where a floating dock is constructed with a central longitudinal keelson, girder, or frame; there being two sets of springs, one on each side of the keelson, and the block or stool being disposed across the keelson, so as to bear on both sets of spring blocks. Similar spring blocks may be provided for the shores to bear upon, and in the case of floating docks such spring shore blocks will lessen any concussion arising from the unavoidable elasticity of the sides of the dock when the dock rolls or pitches. With a view also to prevent or lessen such concussion, a ship in the floating dock may be secured entirely, or principally, to one side by a combination of shores and chains.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1863, November 18.—N° 2895.

GRÆME, Patrick St. George.—(*Provisional protection only.*) —" Improvements in ships or vessels for war and other purposes." The invention " consists, in one part, in constructing the hull of " a ship or vessel of an elliptic or other similar flat transverse

" sectional form in such a manner that the dimension of the width " of the vessel will be considerably in excess of that of its height. " Both ends of the vessel terminate in points, being formed of " an approximating conical shape, and may in some cases be " arranged to act as rams."

In the central part of the vessel " I form a chamber or enclo- " sure for containing the engine room, which chamber is sunk to " a certain extent below the bottom of the other part of the " vessel," thus increasing the stability, and the form of this projecting part of the chamber is made to approximate to that which offers the least resistance when passing through the water. The vessel is propelled, by preference, by means of a rotary pump or pumps, by drawing in water through one or more passages, and discharging the same through one or more other passages; these passages, being so arranged as to turn the vessel in whatever direction may be required, or to give it a side motion.

The vessel is, by preference, entirely closed in, and when intended for war purposes is provided with one or more turrets or cupolas, either fixed or revolving, and is covered above the water line, and to a certain extent below the same, with armour plating which, owing to the obliqueness of the surface of the vessel, and the consequent angle at which projectiles would strike the same, need only be of a slight thickness at the top of the vessel, and may gradually increase in thickness towards the sides.

The steering of the vessel is effected by means of one or more rudders projecting below the bottom of the vessel. The lower pivots of the rudders are supported by means of a framing attached to the bottom of the vessel, and the rudders are so formed that the pivots upon which they turn are placed in a line that passes through the centre of gravity of the rudder, or nearly so.

If the vessel is provided with a central turret or cupola for war purposes, " I arrange the chimney from the engine room to " pass through the centre of the same, and there surround it by " an outer casing covered with armour plating that will both pro- " tect the chimney and serve as a traverse to protect the guns " and men in the turret."

" At the top of the turret or turrets I propose to fix a series of " wrought-iron bars, either solid or hollow, or partially so, and " so formed and arranged as in a great measure to protect the " men and guns in a war vessel from an enemy's fire, as also to

"serve as a framing for a covering in unfavourable weather. I "also propose to construct 'iron-clad borer boats' in contra-"distinction to iron-clad gun boats on the principles above "described, such being armed with a powerful rotating steel borer "projecting from one or both ends of the same, such borer being, "by preference, of an oval or spherical form, the surface of "which would be covered with a series of sharp points or teeth, "or the borer may be of a pyramidal or conical form, with sharp "projecting edges running from the apex to the base." These borers are for the purpose of boring holes through the sides of vessels below the water line, the propeller of the boat being kept in motion the while for the purpose of obtaining the necessary pressure for doing so. Should the borer bits be found liable to break when in the vessel, it is proposed to connect the same by means of a wire rope to the borer shaft, so as to draw the broken piece out on the retreat of the borer boat.

[Printed, 4d. No Drawings.]

A.D. 1863, November 20.—N° 2922.

McLAINE, ALEXANDER.—(*Provisional protection only.*)—"Im-"provements in the construction of gun boats, gun vessels, and "rams." This invention "is to render such vessels as the "American Monitors fit to make a voyage in any weather by "erecting above their ordinary deck an upper story of iron, with "or without wooden deck plank or raised roof, with sides down "to the hull; this upper" story "is secured to angle iron round "the gunwale by screw bolts with india-rubber slips for tighten-"ing, or by rivets. The upper story is constructed to be wholly "or partially removable before going into action, and is arranged "as the ordinary abode of officers and crew in peaceable times. "In the event of the gun boats, gun vessels, or rams having a "turret or turrets, cupola or cupolas, the said turret or turrets, "cupola or cupolas, may or may not project through and above "the said raised roof or additional story."

[Printed, 4d. No Drawings.]

A.D. 1863, November 20.—N° 2924.

NEWTON, WILLIAM EDWARD.—(*A communication from Milton Nobles.*)—"Improvements in the construction of fan blowers for "ventilating and other purposes." The invention consists "in

" gathering and expelling from an apartment of any kind the foul " air or gases, and at the same time and by the same apparatus " drawing in fresh air from without and forcing it into the apart- " ment to supply the place of that expelled, thus doing two " things at one and the same time, or by one and the same ope- " ration, both of which are essential to a speedy change of air " in the apartment to be ventilated, as will be explained."

The eyes of the fan cases are tightly closed up, and from them pipes or air ducts " lead to the points or places where the foul air " is to be taken in and carried to, and where the fresh or pure " air is to come from respectively." At the top of the fan case there are two exit ducts or air trunks, through one of which the impure air is carried out of the apartment, and through the other one of which the pure air is forced into the apartment from without the building, structure, or place to be ventilated. The interior of the fan case is divided by a partition corresponding to the division board of the air trunks. A fan shaft extends through the fan case from side to side, and may have on its projecting ends pullies, by which it may be driven. Upon this shaft are arranged radial arms, carrying wings or blades of any suitable number or shape, for creating both a suction and exhaust current through the apparatus from the apartment to the external air, and from the external air to the apartment, or counter currents of foul and of pure air. The fan case may be divided horizontally if desired, and be hinged with a suitable tightening and holding catch or latch for the purposes of access to the interior.

" The fresh air drawn in and distributed through the apartment " may be cooled or moistened, or both, artificially, by drawing " or expelling it through an ice-box, water chamber, or other- " wise. For expelling smoke or gases from gun decks or towers, " or for ventilating the holds of vessels, this apparatus is " peculiarly applicable, and it may be also applied to buildings, " vaults, mines, and other places. The fan is both a suction " and forcing fan taking from a specific place, and forcing to " another specific place the air within its influence, and it may be " made to rotate in either direction without changing this " characteristic of its operation, but in changing its motion the " terminations of its inlets and exits should be arranged " accordingly."

[Printed, 8*d*. Drawing.]

A.D. 1863, November 23.—N° 2945.

SMITH, JAMES.—" An improved composition for coating or " covering the bottoms of ships." This invention has for its object " to produce a greasy, unctuous, and at the same time " waterproof and durable composition, which, when applied to " ships' bottoms, whether constructed of wood or iron, will " protect them, and prevent barnacles or other marine animals, " and seaweed or vegetable substances from adhering thereto."

The improved composition " consists of tallow, fat, or other " solid grease, with the addition of seal or other liquid oil for " softening the grease or fat. To this is added shellac dissolved " in wood naphtha, or other suitable solvent, and a small quantity " of gum thuss, to modify to some extent the brittleness of the " shellac."

In carrying out the invention " I take, say, ten hundredweight " of tallow or grease, and ten gallons of seal oil, or linseed oil, and " I heat these ingredients together until they nearly boil; I then " add about six gallons of shellac varnish, made by dissolving " the shellac in naphtha, and two hundredweight of gum thuss, " dissolved in naphtha or other solvent. These ingredients are " added to the melted tallow and oil while the latter are hot. " White lead and ochre may be added to the composition for the " purpose of colouring the same. This composition may then be " applied to the ship's bottom in the ordinary manner, and it " will effectually prevent any marine animals or vegetation from " adhering thereto."

[Printed, 4d. No Drawings.]

A.D. 1863, November 26.—N° 2974.

BAKER, JAMES.—" Improvements in compositions applicable to " the coating of ships' bottoms." According to this invention, sulphur, asphaltum, or similar adhesive substances, and black oxide of manganese are combined together. The proportions in which these substances are combined may be varied, but it is preferred to employ them at the rate of about two parts by weight of sulphur, one part by weight of asphaltum or similar substance, and one part by weight of black oxide of manganese. These matters are intimately mixed, and are to be applied, when heated,

to the extent necessary to melt the asphaltum or like substance in the compound.

The composition is particularly applicable for coating the bottoms of iron ships, to protect them, and prevent the adhesion of weeds; it is, however, applicable to other ironwork, and will protect it from the weather. It is applied in a melted state, and it works more readily if the metal be also heated. It can be laid on with a brush, and the surface afterwards finished, to render it smooth, by means of heated irons, for it will be found that the composition sets too rapidly to allow of an even coat being obtained conveniently with the brush alone.

[Printed, 4d. No Drawings.]

A.D. 1863, November 30.—N° 2995.

ALBINI, Augusto.—(*Provisional protection only.*)—" Improve-" ments in ships of war and in arming ships of war." The invention consists in constructing and arming ships of war in the manner herein-after explained, by which method of construction and arming, guns at the bow and stern of the ship can fire in the direction of the keel.

" In building and arming ships of war according to my in-" vention I do not alter the figure of the ship so as to affect " its seaworthy qualities, the hull being similar to the hull of " ordinary ships from the keel to the line of the main deck. " My improvements are situated above the main deck. Instead " of building the bulwarks above the main deck on each side of " the ship of the ordinary figure, I make them of an angular " figure, that is, in place of the ordinary curved form I make " a series of angular recesses formed by vertical planes situated " alternately at right angles, or nearly right angles, and parallel " with the keel, or with the ship's longest diameter. These " angular recesses, commencing at the bow and stern respectively, " extend on either side in the direction of the ship's length, to a " distance depending on the number of guns required, each gun " being situated in one of the angular recesses described. That " side of each angular" recess " which is transverse to the ship's " length, and through which a gun is fired, I protect with armour " plates six or seven inches thick, and that side of each angular " recess which is parallel to the ship's length I protect with " thinner armour plates. By this arrangement the weight of the

" armour plating and of the guns, instead of being on the outer " edge of the ship, is brought near the centre of the ship, and " the tendency to a rolling motion in the ship diminished. Heavy " guns can be carried and fired much nearer the centre of the " ship than if they were fixed on the broadside. The bow and " stern are not overloaded by this arrangement, as the weight is " uniformly divided in the direction of the length of the ship, " and the projecting stem under the water line gives sufficient " buoyancy to the ship. The guns inside the angular recesses or " casemates are mounted on carriages which are worked on one " side, as they are fixed so close to the bulwarks as to have only " sufficient room for the limited training of the guns required to " concentrate their fires. I prefer to mount the guns on sliding " carriages, as they offer great facilities for working the guns on " one side, and in a rough sea to bring the guns to lay on the " end of the slide, and thereby bring the weight more amidship. " In order to preserve the outside shape of the ship at each end " when not in action I close the angular recesses with ports of " the ordinary kind working on hinges, or I arrange the ports so " that they may be moved like a door and fall in and lie flush " with the longitudinal side of the casemates when in action. " I do not limit myself to these arrangements, as the ports may " be entirely dispensed with and the upper deck made to follow " the angular shape of the recesses. Instead of making the " recesses of the angular shape described, the angles of the said " recesses may be rounded, the outer angles with convex planes " and the inner angles with concave planes, so as to give to the " said recesses an undulatory instead of a rectangular figure. " The sides of the angular recesses parallel with the keel may " have portholes through which the guns can be fired broadside."

[Printed, 4*d*. No Drawings.]

A.D. 1863, December 1.—N° 3012.

REDMAN, Jesse Gustavus, and MARTIN, George.—" Improvements in compounds or compositions for coating or covering " iron or wooden ships and vessels, metallic sheathing, telegraph " cables, and other objects, to preserve them from decay, fouling, or " other destructive action." The invention consists " of certain improvements in compounds or compositions for the purposes of " *coating or* covering iron or wooden ships or vessels, metallic

"sheathing, telegraph cables, and any other objects, bodies, or "structures, in order to protect or preserve them from decay, "corrosion, or fouling by the action of salt or fresh water, or at-"mospheric influence, or from other natural destructive action "whether animal, mineral, or vegetable."

"We take oxidized brass, or protoxide of copper ground in "water and ofterwards dried, oxide of zinc, or alumina, and "oxide of lead, and then boil them in vegetable pitch or a mixture "of vegetable pitch and mineral pitch, vegetable tar, or a mix-"ture of vegetable tar and mineral tar, or vegetable tar and rosin, "or rosin oil and vegetable tar, until the pitch, tar, rosin oil, and "oxides are oxidized and oxidated, and a quick drying metallic "varnish is formed. The metallic varnish may be thinned for "use by rectified mineral naptha, petroleum spirit, or any other "cheap spirits, and to every fourteen gallons of the varnish we "add one quart of pure carbolic acid.

"The following proportions are what we have found most suit-"able to form the metallic compound:—

"Oxidized brass - -	150 to 200 lbs.
or,	
"Protoxide of copper -	75 to 90 "
"Oxide of zinc - -	30 to 40 "
"Oxide of lead - -	25 to 40 "
"Alumina - - -	25 to 50 "

"When alumina is used, the zinc is omitted.

"As an example, we give the proportions of the above in-"gredients mixed with" tar:—

"Vegetable tar - - -	200 lbs.
"Rosin oil - - - -	150 "
"Oxide of copper - - -	75 "
"Oxide of zinc - - -	30 "

or,

"Vegetable tar.	Rosin oil.	Rosin.	Oxide of copper.	Oxide of zinc.
"228 lbs.	170 lbs.	nil.	90 lbs.	40 lbs.
"or, 250 "	nil.	100 lbs.	75 "	30 " "

The same proportions of pitch may be used; or there may be a mixture of vegetable and mineral tars, or pitches, there being two parts of vegetable to one of mineral.

"When any of the above are used for covering iron, two or "more protective coats should be applied, which may consist of "*pitch, or pitch* and asphalte varnish, or we mostly prefer a

" varnish composed of the following ingredients:—We melt
" together 6 parts of mineral pitch and 4 parts of asphalte (by
" weight), and thin for use with rectified naptha or other spirit.

" The following ingredients form our protective varnish paint:—

" Oxide of zinc -	- 10 parts.		by weight.
" Peroxide of manganese -	2 "		
" Rosin oil -	- 7 "		
" Rosin - -	- 5 "		
" Linseed oil -	- 14 "		

" For special applications the rosin and rosin oil may be omitted,
" and the following may be used:—

" Oxide of zinc -	- $1\frac{1}{2}$ parts.	by weight.
" Peroxide of manganese or umber - -	- $\frac{1}{4}$ "	
" Linseed oil -	- $1\frac{3}{8}$ "	
" Yellow ochre -	- $\frac{1}{2}$ "	

" We thoroughly mix the above ingredients, and boil them to-
" gether for a sufficiently long period until they become suspended
" in the form of a paint or varnish, and we then thin the com-
" position with petroleum spirit or rectified mineral naptha."

[Printed, 4d. No Drawings.]

A.D. 1863, December 1.—N° 3013.

LUMLEY, Henry.—" Improvements in apparatus for steering."
This invention " relates to my rudder for which I obtained Her
" Majesty's Letters Patent, N° 1150, dated 19th April 1862, and
" in which an after piece or tail is articulated to a body or inner
" portion, whereby a recessed surface of rudder is presented to the
" water instead of a plane surface as in the common rudder;
" and my present improvements mainly consist in guiding or
" controlling the tail so as to obtain a suitable recessing move-
" ment of the rudder, by means of guides or appliances which may,
" if desirable, be wholly or partially above the line of floatation.

" In one arrangement a stud post, axis, or controlling piece, is
" received by or works in a slot or groove.

" In one form of this arrangement the slot or groove, which is in
" a tiller bar arm or piece connected with the tail or after piece,
" receives or works on or about a fixed stud post, axis, or rod,
" which may be held in a frame so as to be perpendicular to the

" direction of the fore and aft line of the vessel, or it may be " adjustable so as to adjust the angle of the tail.

" In another arrangement the stud, rod, post, or axis may be on " the tail and work in a fixed or adjustable slot or groove. Its " travel may be limited by a stud or bolt passed through the slotted or grooved piece.

" In another arrangement arms, levers, or frames, may be con- " nected combined or in contact with the tail and work to and " fro or in and out.

" When I use chains or the like I sometimes carry them over " the body or inner piece of the rudder instead of through it; and " I sometimes pass the end of each chain through an eye where " it is held, either by a link too large to run through the eye or " by other form of stop or connection, the other end being carried " to above water line, thus facilitating the hauling of the chain to " deck."

" I sometimes " use " two curved arms, one on each side of the " rudder; such arms working in and out or to and fro, and their " outer ends being connected or in contact with the rudder.

" I sometimes work the tail of the rudder by means of a tiller " or yoke, or bar or bars independent of that by which I work " the body; such tiller or yoke, or bar or bars of the tail being " worked from the vessel."

[Printed, 10*d*. Drawing.]

A.D. 1863, December 1.—N° 3014.

TURNBULL, Robert.—" Improvements in sheathing iron " vessels and armour-plated ships." The invention relates, " first, to improvements in sheathing iron-clad vessels of war. " For this purpose, supposing the vessel to be a new wooden " ship, and the only iron externally to be the armour plates, I apply " these plates in alternate longitudinal rows, of thick and thin " plates, that is to say, if the armour plating of the ship is to be " four-and-a-half inches, I alternate a row of such plates, which " are about three feet wide, with a row of narrow plates, say, " about twelve inches wide by about six inches thick; all these " plates are bedded, and suitably fixed on a uniform surface, the " thick plates therefore project beyond the thin ones to the extent " of their extra thickness; before fixing these plates their edges " to the extent of the extra thickness are undercut, or have what

" is termed a standing bevil formed thereon, so that between two " thick plates a dovetail (so to speak) is formed. After fixing " the plates I fill in and cover the four-and-a-half inch plates " with short pieces of wood, some three or four inches thick, the " ends being bevilled to fit into the thick plates in which they " hold.

" For the convenience of fitting and wedging up tight and re- " moving them if necessary, I place these pieces of covering wood " a little inclined to the upright, and reverse their inclinations at " short intervals, the space between the opposite inclination being " filled up by a wedge-shaped or oppositely inclined piece suited " to the space. The four-and-a-half inch plates are thus perfectly " and securely covered with wood, the surface of which projects " from an inch and a half to two inches beyond the thickness " plates. These plates are covered in by longitudinal planking, " some three or four inches wider than the narrow iron plates " (say, fifteen or sixteen inches wide). The edges of this plank- " ing are recessed into the timber dovetailed between the narrow " plates, and it is of a thickness when so let in to be flush with " the thick timber covering the thin plating. The whole there- " fore presents a level surface. The longitudinal planks are " secured at their edges to the dovetailed timber by screws or " other suitable fastenings, which do not pass through the dove- " tailed timber. The seams are formed suitable for caulking or " otherwise rendering them water-tight. The lower strake or " strip of iron would of course be a thick one, and should be " sunk below the surface of the ship's side a distance equal to " the longitudinal plank used to cover it, so that the whole will " present a uniform surface, which may be coppered precisely in " the manner of an ordinary wood ship, galvanic action being " entirely prevented by the perfect closing in and protection of " the iron of the plates from the sea water. For the upper plates " and where the copper does extend the dovetailed planking may " be thinned at its upper end to the thickness of the dovetail, " and so be flush with the upper thick plate, which in that case " would be exposed outside. I prefer to dispose a thick plate at " the level of the water line, where its increased strength would " be of greatest use.

" In sheathing wood ships already armour plated I apply " longitudinal thickness strips or pieces dovetailed or undercut " to represent the increased thickness of plate before described,

" which being fixed to the armour plating may then be covered " in the manner similar to that before described, or instead of " placing the thickness pieces longitudinally they may be vertical " or inclined. In either case I incline the filling dovetailed pieces " of timber to the direction of the dovetailed recess formed by " the standing bevils, that is to say, they are not placed directly " transverse between the two (at right angles thereto), but a " little slanting, the slant being reversed at intervals as before " described. The thickness pieces of plating fixed on as last " herein described need not be of the breadth of twelve inches " before mentioned, but in either case must be covered in by a " timber of suitable breadth, fitted and secured as described.

" In building armour-plated vessels I either use thick and thin " rows of plates alternately, or apply thickness strips as above " mentioned, and sheath and cover the entire surface of the " bottom as well as the armour plates as before described. In- " stead of using thick and thin plates in the structure of the skin " of an iron vessel, the thickness dovetailed pieces for holding on " the wood sheathing may be bolted or otherwise fixed thereon " at intervals, and in any direction that may be desired. By " means of this wood sheathing I am enabled to copper sheath " the bottom and armour plating of iron ships, and so protect " them and prevent their bottoms fouling in as efficient a manner " as a coppered wooden ship, at the same time preventing all " galvanic action and destruction of plates thereby."

[Printed, 10*d*. Drawing.]

A.D. 1863, December 2.—N° 3036.

LUNGLEY, CHARLES.—" Improvements in the construction of " ships of war and other vessels." " I construct ships with iron " frames with iron plating worked inside to form a water-tight " skin inside the frames, to which the plating can be secured " in a similar manner to that in which the iron frames are secured " by the ordinary method when the skin is worked outside the " frames. Inside the skin or plating inside the frames the vessel " can be divided by horizontal and vertical bulkheads or dia- " phragms as required, either to make the vessel unsinkable, or " for any other purpose. The frames, which are worked outside " the iron skin or plating, can be fitted with floor plates, inter- " costal keelsons, and reversed frames, as required. In the case

" of ordinary mercantile ships or steamers, wood pieces can be " secured to the sides of the frames, or between the frames, to " which either a single or a double thickness of planking can " be secured, to form an outer skin, which can be fastened with " copper or yellow metal screws or bolts, and can be sheathed " with copper or yellow metal, as an ordinary copper fastened " wood-bottomed ship."

" In building ships where great strength is required, or to " carry armour plates for war purposes, the frames which are " worked outside of the inner water-tight skin plating I make " into web frames by a plate of iron, with either single or double " angle iron on inner edge and outer edge, so as to leave space " enough to allow a workman to go down between the inner skin " of iron and the outer skin of wood to screw nuts on to the " points of bolts in building, or for rivetting in repairs, and " also for cleaning and painting the surface of the ironwork and " otherwise. In working the outer planking the ordinary " system of working the wood planking of a single thickness " can be adopted, or the system of working two" thicknesses " of planking with diagonal straps let into and between them, as " specified in the Specification of a Patent granted to me, 1st " October 1852, N° 103, can be carried out with great facility."

" In building ships for defensive purposes, to be shell or shot " proof, the armour plating can be worked directly on to the " web frames, which can have a set-in at the place required " below the line of floatation; for that purpose the inner thick- " ness of outside planking with the diagonal straps or plates can " be bolted by bolts passing through the straps, plate, armour " plate, and angle iron on outer edge of web frames. Any " required amount of backing of wood or other material for the " armour plates can be worked between the web frames and the " armour plating before the armour plating is worked, and may " be secured by the same bolts as" " the diagonal straps, inside " planking, and armour plates; the outer thickness of planking " can be secured by copper or yellow metal screw bolts to the " inside planking."

" In building armour-plated ships for great defensive power, " I make the frames of stout bar iron instead of thin web plates " at the back of the armour plates or frames, secured at the lower " end to the web plates below the armour by rivets or bolts, and " *to the inside* skin by double angle iron rivetted to inner edge

"and to the inner skin. The bar irons of frames are forged "large, or made with a swell on each side, where bolts are required "to pass through edgeways for securing the armour plating. "The bolts for securing armour plating should be about the "same diameter as the armour plate is thick; the part which "passes through the bar frame is made with a square cut or "square thread for screwing. The part through the armour plate "is turned of such a shape as to appear like a number of collars, "gradually increasing in diameter from the inner edge to the "outer edge.

"When the armour plate is fitted, a rough hole having been "made before it is put up, and a rough hole having been made "in the bar frame, a screw-cutting boring bar bores the hole out "to a perfect fit for the bolts, which can be made with a square "point standing through the inner skin, for heaving up tight."

"Sometimes I secure the inner planking of the outer skin to "the armour plate by small bolts tapped into the armour plate "by a plug tap about as deep as the bolt is large in diameter. "The outer planking of the outer skin is then secured to the "inner planking by copper or yellow metal or other screws, "bolts, or nails."

"I also place the armour plates in some cases so far back as to "cover them over with planking, and bring up the covering of "wood to any required distance, and thus shew the wood flush; "and I bring on in this case one skin to be fastened on first, "and then another skin over the first to be fastened on with "metal or copper bolts to the first skin; the straps or binders of "iron may run up and be let into the planks in the same way as "into the bottom planks.

"I adopt this plan for the iron-plated and iron ships, that is, "to cover the parts over with one skin of wood secured on to "the plating or ironwork with rivets or bolts, and then to bring "on another skin of wood to be secured on to the first skin with "metal or copper screws or bolts, so as to enable the ship to be "kept free from the galvanic action of copper and iron.

"I also work the rudder with Z or double cranks actuated by "guides, or rods, or screws, the connections being made through "the ship by a water-tight trunk or tube. I place the rudder on "a wide post as far from the aperture for screws as possible, and "place the connections for steering as near the body of the "*rudder as possible.*"

[Printed, 1s. 4d. Drawings.]

A.D. 1863, December 7.—N° 3073.

TILLING, GEORGE ROBERT, and PARK, JOHN.—" Improve-
" ments in steering gear for ships and other vessels." "We
" secure a tiller or arm to the rudder head, and in or to the former
" we fit a sliding block of peculiar construction, the opening
" through the inner part of which is screwed to work on a
" screwed shaft. Rotatory motion obtained from a steering
" wheel or steering wheels handled in the usual way, or rotatory
" motion otherwise obtained, is conveyed by wheel or other con-
" necting gear to the screwed shaft above mentioned, to cause the
" sliding block to travel in accordance with the motion given,
" towards one end or the other of the said screwed shaft. The
" sliding block fitted as above mentioned will, therefore, when
" motion is given, move the tiller or arm, the outer end of which
" will describe the arc of a circle, with it the rudder head, and
" thereby bring the rudder into the desired position.

" The sliding block is fitted to travel in a slot or opening in the
" tiller or arm, and the outer parts thereof, which come in contact
" with the surfaces of the slot opening, are made smooth and
" fitted with guiding flanges. Inside the said block there is a
" nut or piece with a screwed opening therethrough in which the
" screwed shaft works. The external form of this nut or piece is
" spherical, with two projecting poles which represent the axis on
" which it moves, to fit the screwed shaft properly at all times
" and in any position or angle in and at which the tiller or arm
" and the rudder may be placed.

" In some arrangements two or more tillers would be employed,
" each of which could have a separate sliding block, and such
" sliding blocks could also be provided with separate screwed
" shafts, the latter being in all cases made to rest in and against
" bearings supported by strong framework."

[Printed, 10*d*. Drawing.]

A.D. 1863, December 10.—N° 3110.

GALLOWAY, WILLIAM, and GALLOWAY, JOHN.—(*A communication from John Cochrane.*)—(*Provisional protection only.*)—
" Improvements in presses for bending metal plates into the
" various forms required in naval architecture, and for other pur-
" poses." This invention consists, "firstly, in so constructing
" presses for bending plates, that the 'cope' or upper resisting

" table, instead of being made as heretofore of a solid inflexible " and unchangeable form, shall be capable of being altered and " adapted to any required form within the range of its mechanical " capacity by being composed of a number of resisting lines or " points that can be individually elevated or depressed at pleasure, " and thereby be so arranged and set as to fit or suit the curves " and lines of the particular form which the plate is required to " assume."

Secondly, in forming the lower table or "platen" of as many parts, and having the same order of arrangement as those of the "cope," so that the parts of the former shall be opposite the latter, or nearly so; and, thirdly, in operating the several parts of the said "platen" simultaneously, by means of hydraulic pressure, in such wise that each part shall be forced against or towards the corresponding parts of the "cope," the aggregate form produced by the parts of the "platen" being thus made to adapt itself to the form of the "cope," and consequently to impart such form to any metal plate that may be situated between the "cope" and the " platen."

[Printed, 4*d*. No Drawings.]

A.D. 1863, December 10.—N° 3115.

CLARK, William.—(*A communication from William Stuart Auchincloss.*)—(*Provisional protection only.*)—" Certain improve- " ments in port closers for vessels of war and forts." This invention consists "in the employment or use, for the purpose " of closing the ports of vessels of war or the embrasures of " forts, of two rollers, each being made to rotate independently of " the other and provided with a cavity in one side, so that by " turning the rollers in such a position that the cavities face each " other an opening is obtained which allows of giving to the " gun any desired elevation or depression, and at the same time " said rollers allow of training the gun to an angle of 45 degrees " or more with the beam, and if the rollers are both turned in " such a position that the cavities face the interior of the vessel " or fort, the port or embrasure is firmly closed;" "also in the " application of semicircular flanges embracing the backs or inner " sides of the rollers at top and bottom in such a manner that " any strain brought to bear on the outside of the rollers is sus- " tained by said flanges, and the gudgeons of the rollers are

" entirely relieved and not liable to get injured by shot or shell
" which may strike said rollers."

And, lastly, "in the employment or use of india-rubber or
" other suitable packing inserted into the faces and backs of the
" rollers in such a manner that said rollers will close perfectly
" water-tight and prevent the water from entering the ports or
" embrasures."

[Printed, 4*d*. No Drawings.]

A.D. 1863, December 12.—N° 3142. (* *)

JOHNSON, John Henry.—(*A communication from James McLeod.*)—" Improvements in raising sunken vessels and other
" submerged dead weights, and in preventing the sinking of
" vessels in case of accident at sea, and in the apparatus employed
" therein."

This invention consists in the employment "of flexible air-tight
" buoys attached by means of chains to the bottom of the vessel
" or weight to be raised, and protected from bursting by a
" netting or covering of ropes, such buoys being inflated with
" compressed air by means of air pumps worked by hand or by
" power, in communication with the buoys by means of flexible
" hose pipes; the pumps may be carried on the deck of the
" vessel to be raised if such deck be above the surface of the
" water, or carried upon the deck of a neighbouring vessel when
" the vessel to be raised is entirely submerged. In combination
" with these flexible buoys, or separately if desired, a second set
" of air pumps is employed, communicating by means of a hose
" pipe or pipes with the hold of the vessel through the dec
" thereof, the hatches and companion ways being closely covered
" over so as to prevent the air, which is forced and compressed
" inside the vessel by the pumps, from escaping. The hose leads
" down through the deck to at least one-third of the depth of the
" hold. By this arrangement the water in the vessel may be
" readily expelled by the pressure of the air, a hole or holes being
" made in the bottom of the vessel, if not already existing, for it
" free exit."

[Printed, 8*d*. Drawing.]

A.D. 1863, December 19.—N° 3202.

LEGG, Robert.—(*Provisional protection only.*)—" Improve-
" *ments in the construction of shot-proof iron or steel walls*,

" suitable for the sides of war ships, floating batteries, or forts." The invention consists of " an improved method of constructing " shot-proof iron or steel walls suitable for the sides of war ships, " floating batteries, or forts, in such a manner that the said shot- " proof walls may contribute to or constitute the entire strength " of the sides of a ship so constructed, and also in such a manner " that every piece of the structure shall be supported and " strengthened by the whole, and so that the shot-proof walls " may be self-supporting, instead of being, like the present " armour plates, a load added to the frame of the ship. For this " purpose I propose to use rolled slabs or plates of metal of any " convenient length and thickness, but equal in breadth to the " proposed thickness of the ship's side, and to lay and fasten " them one upon another flatwise. And further, to cause any " one of the said plates to be supported and strengthened by all " its surrounding plates." " I propose to make the said plates " with grooves or indentations in one face, and with ribs or pro- " jections on the other, so that when the plates are secured to " each other the ribs or projections on one plate may fit into the " grooves or indentations of the next. The plates may be secured " together by either rivets, screws or bolts, but I prefer to use " screw bolts, and to protect them by placing them in the middle " of the plates, and to make the groove in the one plate so much " deeper than the projection or rib in the other as to leave a " sufficient space for the heads and nuts, or at least for the nuts " of the bolts. The most convenient form for the plates is that " in which the ribs and grooves are continuous throughout the " length of the plates, and of which a cross section would nearly " represent a common crank."

One or more of the iron plates may be of greater breadth and project inwards, for the purpose of supporting the deck.

[Printed, 6d. Drawing.]

A.D. 1863, December 23.—N° 3249.

MATHEW, John.—" Improvements in the construction of " batteries for ships, forts, and other defences." The invention, as applied to forts, consists in the employment of an iron or other metal tower, incased in masonry or otherwise, covered or surrounded by a glacis, and with an inner turret, made to rise, so that the *gun or guns* may be fired over the glacis, and fall again

to re-load. The gun or guns and the gunners are thus concealed from the enemy, and protected from fire. "I mount the gun or "guns on a turntable or revolving platform, so that they may be "fired in any direction required."

The invention may be applied to ordinary batteries, and also to ships of war. In the latter case "I raise and lower the gun "platform, whether traversing or otherwise, by hydraulic or other "power, as may be found most convenient."

[Printed, 10*d*. Drawing.]

A.D. 1863, December 28.—N° 3281.

TOZER, THOMAS.—"Improvements in the construction of ships "and vessels of war (also applicable to other ships and vessels), "and in batteries and fortifications." This invention relates to certain improvements in the construction of ships and vessels, the object being to afford great strength and power of resistance against shot and shells in regard to vessels of war, the invention being equally applicable to the construction of merchant ships and vessels, and also to batteries and fortifications of every kind.

"I construct the walls or hulls of vessels or batteries of a series "of cellular divisions or spaces formed of horizontal steel or iron "plates and vertical plates of the same thickness rivetted or bolted "thereto by aid of angle iron, the vertical divisions consisting of "plates of a wedge shape, the narrow ends of which are arranged "on the exterior or front of the construction, and between each "series or tier of these wedge plates the horizontal plates of steel "or iron are supported. Each of the cells or spaces" is "to be "filled in with wood, which is held firmly by the wedge-formed "recesses or divisions. The decks or roofs are also to be formed "on the same principle. A backing of teak or iron plating may "be applied, if desired, and armour plate may be applied to the "sides of ships or batteries by means of screw bolts passing "through the wooden wedges and the teak or iron plating, the "entire construction being strengthened by screwing the nuts "inside the vessel or battery tightly up, so as to clamp the armour "plate to the side of the vessel or battery. I form the heads of "the bolts of a circular form, and of such dimensions that their "peripheries come in close proximity, thus affording an extra "protection to the construction, since the heads of the bolts let "in recesses cut in the armour plates or skin of the vessel will

" extend half way across each of the four iron sides of the cells
" containing the wooden wedges, and consequently will take a
" bearing on the iron divisions of the structure.

" I propose to improve the keels of vessels and ships by
" grooving or recessing the lower surface of the keel, and in-
" serting therein a series of rollers, working by gudgeons in
" bearings, in order that when a vessel runs on a rock she may
" be enabled to glide or roll off instead of being firmly fixed or
" set, and ultimately wrecked or broken up."

" A ship or vessel of any size may be constructed according to "
this " invention, whether for war purposes or for commerce; in
" the latter case of course the armour plates would be dispensed
" with; and even in vessels of war I should in many cases
" abandon the use of armour plates, since by the construction
" adopted, the penetration of shot would be effectually resisted
" without the addition of armour plate."

[Printed, 1*s*. 2*d*. Drawings.

A.D. 1863, December 29.—N° 3293.

PENISTON, William Michael. — (*Provisional protection only.*)—" Improvements in constructing and arming ships and " floating batteries." This invention has for its objects to render the armour plating available for strengthening the framing of a ship or vessel, and at the same time to avoid bending or planing the face of the plates, or weakening them by boltholes or screws; also to protect the armour plates, so that after continuous firing, the blow of the shot shall be received on and have to pass through a thick layer of compressed wool, cotton, or other suitable material before reaching the armour plates; and also to facilitate the manœuvring of guns either worked by the turret and turn-table system or otherwise. All these objects may be attained either in the construction of new vessels of iron and timber, or in the reconstruction of old timber vessels.

" In constructing a vessel or floating battery according to this
" invention it is formed with an inner and an outer skin, as has
" before sometimes been the case, the inner and outer " skins
" are at such a distance apart that while the outer one retains the
" curves or mould required, the inner one, where the iron armour
" plating is applied, shall be upright or nearly upright, by which,
" amongst other advantages, the armour plating may be em-

"ployed in a flat or unbent form, the plates being placed with "their greatest length running vertically, and being of such a "length that one plate only in depth is necessary. The outer "skin may be of iron plating secured to iron framing, or may be "of wood planking, or iron or wood framing properly moulded "to the forms or lines desired. The inner skin and framing "constitute a complete inner body or vessel, and are composed "of iron from the keel upwards, whether it be when building a "new ship or when altering an old one, or whether the external "body of such ship be of iron or wood. The inner and outer "skins are bound together by ribs of plate iron at intervals a "little greater than the breadth of the armour plates; these "main ribs on the outer side are formed to the required mould "for the outer skin, and fitted with angle or T iron to secure "them to the outer skin;" "the inner side of the rib is straight "for the length of the armour plate, and to each side of the "straight edge of the rib is rivetted a strip with a dovetail tongue "corresponding with a groove cut in the edges of the armour "plate, by which means the armour plate ties the ribs together "and makes one complete frame. The armour plates are further "secured in their position by angle irons rivetted to the ribs "parallel to the tongue just described, the angle iron coming on "each side of the armour plating, and so forming grooves in "which the plates fit, and thus secure it in place laterally without "any strain on the tongue. The armour plates thus secured in "and forming part of the framing form the upper portion of the "inner skin of the vessel, and this portion may be further "strengthened if required by bars of angle iron at the back. "The lower portion of the inner skin is formed in the ordinary "manner of iron ship building."

The cells thus formed will be filled with cotton, wool, or other suitable material, which will previously have been rendered incombustible, and will be pressed up from below by hydraulic or other pressure applied at a point just below that at which the cells are filled, so that whatever disturbance may be made in the upper part, the pressure from below will serve to fill up any spaces or vacuities that may be caused by shot or shell.

"When it is desired to have a backing of wood behind the "armour plating, I carry up the inner skin of iron plating to the "top of the armour plating, and connect this skin with the "*outer skin* by webs, and to these webs the armour plates are

" attached in like manner to that above described, a space being " left between the armour plates and the inner skin that is filled in " with wood backing, the space between the outer skin and the " armour plates is, as before, filled in with cotton, wool, or other " suitable material.

" In arming ships and floating batteries it has before been pro-" posed to mount guns on platforms, which are capable of being " raised to and lowered from the positions where the guns are " fired. When employing this system of arming a ship or " battery, I use hydraulic power to raise and lower the platforms, " and where two, three, or more of such rising and descending " platforms are used, I, at the level to which the platforms are " brought, construct a rail or tramway between the platforms, in " order that the guns may be run off from and again on to such " platforms, or from one platform to another, by which means " and by having a spare gun or guns in the event of any injury " to a gun or its carriage, the same may be replaced by " another gun and carriage, and such ways between the places " occupied by the platforms when down will be found to " present other advantages in addition to the one above named. " When using rising and descending platforms, it is preferred " that they should be arranged in the manner of turntables."

[Printed, 4*d*. No Drawings.]

1864.

A.D. 1864, January 5.—N° 27.

BARNARD, William Brainard. — (*Provisional protection only*.)—" Improvements in the mode of uniting metallic surfaces, " applicable to sheathing or lining vessels, and to other purposes."

" These improvements relate chiefly to the manner of forming the " holes in the surface of metallic vessels or plates into which the " rivets are driven, and to the mode of preparing uneven surfaces " to receive the sheathing or lining. When metallic surfaces are " united by means of rivets, suitable holes are formed in the under " or thicker surface. For contracting the outer ends of these " holes a taper punch is employed. By blows upon this punch " a countersink is produced in the mouth of the holes, while

" they are interiorly enlarged. When rivets are driven in the " holes thus prepared they completely fill the interiorly enlarged " cavities, and are thereby firmly secured in the under surface.

" In joining metallic plates to form the sides of vessels or other " extended surfaces the edges are usually lapped, or the plates " are joined together by means of bats secured over the joints, " thereby producing broken or uneven surfaces. The angular " spaces formed by the lapping of the plates, or the batting of " the joints, are filled with beveled or wedge-shaped pieces. The " principal object of these pieces is to secure a surface for sheath- " ing or lining free from corners or sharp angles, though these " pieces may be formed of or coated with a suitable adhesive " substance, for the purpose of keeping them in position and " effectually preventing any leakage of the joints."

[Printed, 4*d*. No Drawings.]

A.D. 1864, January 12.—N° 88.

ASKEW, Charles.—" Improvements in coating or sheathing " iron ships, iron floating batteries, graving docks, and buoys." " When coating or sheathing an iron ship, I clean the ship's side " as if for the application of one of the preservative compositions " now commonly employed, and put on a thick coating of tar, " or " " other similar material;" " over this I place thick and " coarse paper saturated in oil, I use by preference boiled oil, and " tar again over the paper. I attach wood " " of a suitable thick- " ness, to the ship's side with iron or metal screws, washers being " placed under the heads of the screws. The screws enter holes " drilled and tapped in the ship's side, so as to firmly fix the wood. " The heads of the screws are sunk below the surface of the wood, " and the holes are filled up over them with wooden plugs driven " in so as to make a flush surface. Over the wood tar is again " applied, and over that thick coarse paper saturated with oil, as " before. The sheathing metal is laid on over all and nailed to " the wood in the ordinary way as when sheathing a wooden ship. " All the edges of the wooden planking are bevilled, and they are " made to fit the one to the other accurately, and are made tight " with red and white lead or tar. I prefer to use two parts of " white" lead " and one of red, ground together with oil, so as to " make a paint, and the surfaces to make the joint are thickly " painted over with this composition before the parts are put

" together. Particular care is taken also that the lapped joints of " the metal sheathing are made perfectly tight with red and white " lead and thick coarse paper. Strips of paper saturated with oil " are painted over on both sides with the lead paint and are placed " between the sheathing plates at the joints, thus the ship is " enclosed in a wood and sheathing metal case which prevents " the possibility of the sea water getting to the iron and stops all " galvanic action."

" At the extreme edges of the metal sheathing at the keel, and " above the water line of a ship, or elsewhere, where the wooden " planking stops and the metal sheathing comes in contact with " the skin of the ship, the sheathing and the metal skin are fixed " together by drilling holes to suitable depths, according to the " thickness of the skin, usually about half through it, and tap- " ping the said holes with a coarse thread, then rivetting the " sheathing metal to the ship's side by putting a plain soft copper " rivet into the tapped hole and rivetting the same. The rivet " holes are countersunk at their mouths so that the finished work " may have a flush surface.

" In the process of rivetting the rivet is forced into the thread, " which securely holds the sheathing metal to the metal skin. I " also have a notch cut into the tapped hole, which prevents the " possibility of the rivets turning and screwing out of their holes. " Paper saturated with oil and painted over with lead paint or " tar, as above described, should be interposed between the surface " of the ship and the sheathing metal to keep them out of actual " contact; with the same object, also, the surface of the ship is " cleaned and thoroughly tarred before applying the paper. In a " similar manner the whole of the sheathing may be applied with- " out any wooden planking. This arrangement is very efficient, " but perhaps more expensive than when planking is used " Floating batteries, graving docks, and buoys, may be coated " and sheathed in manner precisely similar."

[Printed, 6*d*. Drawing.]

A.D. 1864, January 14.—N° 105.

PLUM, THOMAS WILLIAM.—" Improvements in forging, rolling, " and shaping iron and other metals, and in tools employed " therein." This invention consists " of improvements in forg- " *ing, rolling, and* shaping iron and other metals, in and for the

"manufacture of tyres for railway and other wheels, of bosses, "guns, rings, and other like metal work, and in tools employed "therein, and in forging or rolling ribs or stringers for fixing "armour plates upon ships or batteries."

"For the purpose of fixing armour plates to ships and bat- "teries I forge and roll ribs or stringers of such forms that the "contraction and expansion of the plates and the bolts under "different temperatures are more or less mutually compensated." These ribs or stringers are narrow dovetailed strips lying between the edges and ends of the plates, and carrying all the fastening bolts. The heads of the bolts are fitted into the stringers from the inside, and do not come through. The width of the stringers is such that they will not bed upon the backing, but stand out from it a little space. "The space left at the back of the rib will admit "of its being drawn closer to or driven farther from the surface "to which the plating is fixed when acted upon by expansion or "contraction of the plates and bolts, which I prefer should be "square." "Holes are made through the body of the structure "between the bolts, so that air may traverse the channels under "or behind the stringers and vertical fixing ribs."

[Printed, 8*d*. Drawing.]

A.D. 1864, January 15.—N° 118.

CATO, PETER.—"Improvements in the construction of combined "iron and timber ships." In constructing ships and other navigable vessels of the combined iron and timber class, in which the ribs or frames are of iron, and the planking of wood, "I "make the said ribs or frames of iron in the form known as "double bulb tee-iron, with the broad web or top cross part of "the tee on the outside in contact with the planking, and the "double bulb inside; and I employ as means for keeping such "ribs or frames and the planking" together, the dowel fastener or joint, "for which I obtained Letters Patent of date the 28th "September 1863, N° 2379.

"Combined iron and timber ships, having iron ribs or frames, "and timber bottoms or floors, both when the said iron ribs "or frames pass wholly or partially on the inside of, or in spaces "or recesses formed in the floor timbers, and when they come "down and terminate over or in recesses in the timber floors, I "*construct* with timber logs on each side of the ship at the ends

" of the floor timbers; and as such floor timbers would usually " terminate about the bilges of a ship or vessel, I have named " them, the said timbers which I employ, bilge logs. Such logs " are kept in position or connected to the floor timbers princi- " pally, if not entirely, by " dowel " fastenings or joints. The iron " which I prefer to employ in the construction of the ribs or " frames is double bulb tee-iron, although angle iron 'back to " 'back,' or other form of iron ribs or frames might be employed, " and both the iron frames and wooden floors I prefer to cover " with wooden planking, the parts being kept in position by " dowel " joints or fastenings."

[Printed, 8*d*. Drawing.]

A.D. 1864, January 22.—N° 171.

BAGOT, Henry Chapman.—" Improvements in the construc- " tion of navigable vessels." The invention consists, firstly, in constructing ships, both those with timber and those with iron frames, with planking of split wood, instead of using sawn or other tool-prepared wood cut more or less across the grain.

Secondly, where double planking is used in the construction of ships, whether with iron or timber frames, in securing the outer to the inner planking by metal or other screws passed through the inner planking (after it has been secured to the frames), and into the outer planking. In this manner a timber surface only is in contact with the water, an object of great importance in canals, and waters near to chemical works of different kinds. Of course more than two thicknesses of planking might be used.

And, thirdly, in constructing ships with the bottoms, sides, and decks composed principally of double planking placed diagonally, the vertical and transverse frames ordinarily used being dispensed with, and longitudinal frames either of iron or wood substituted to tie, stiffen, and strengthen the said diagonal plank- ing. "The split wood mentioned under the above first head, " and the mode of fastening planking mentioned under the " above second head, I prefer to use in constructing or build- " ing ships of this kind. For canal and coasting vessels this " construction is very suitable, but it is more especially adapted " for that class of flats or lighters carrying cargo on deck; the " bottoms can be made flat or nearly so, and the sides formed in " position at or about right angles thereto. The bottom of a

" vessel can be secured (mostly if not entirely from the inside) " to the sides, and the sides to the deck by corner longitudinal " pieces or frames of wood or iron."

[Printed, 10*d.* Drawing.]

A.D. 1864, January 22.—N° 177.

WALTON, John Whitehead, WALTON, John Whitehead, junior, and WALTON, Henry Coode.—(*A communication from Henry Walton.*)—(*Provisional protection only.*)—" Improvements in protecting vessels and fortifications from the " effects of projectiles." This invention consists in "coating and " protecting vessels and forts with a series of layers of perforated " skins, the perforations of the one layer being disposed so that " they do not coincide with those of the next, the perforations so " formed have therefore no communication one with another, " We make the surface to receive the protecting coating of suit- " able material, and cover it with a solid layer, and upon that a " thickness of iron armour plate, which is firmly bolted on and " holds the inner layers securely in position; this thickness of " armour plate may be of much less thickness than usual as with " the support of the backing described a much more resisting " medium will be produced. The cavities before mentioned in " the different layers we fill with compressed air, which may be " forced in by an air pump, or it may be the result of the com- " pression of the skins or layers, the air being confined in the cells " is compressed at same time. Instead of skins, as before men- " tioned, we sometimes use layers of gutta percha, india-rubber, " or other material, but in either case the different layers or skins " have the perforations before mentioned studded as thickly as " may be without their coinciding with those of the superposed " or adjoining layers or thicknesses."

[Printed, 4*d.* No Drawings.]

A.D. 1864, January 23.—N° 182.

CLARKSON, Thomas Charles.—" Improvements in ordnance " and in applying certain cylinders and tubes for forming pro- " jectiles and recoil springs, which improvements are applicable for " forming vessels for war and pillars in deep water." This invention, so far as it relates to ships, is for applying tubes or cylinders in their construction, the open ends of the tubes to be

laid in the direction of the thickness of the vessel, by which means "I form a sort of honeycomb construction. This principle is ap-" plicable for forming and lining the sides of hulls of vessels," in which, by plugging the said tubes or cylinders with wooden blocks, having layers of sheet cork in the centre, (which allows for the shrinking of the wood,) "I obtain greater strength and buoy-" ancy. In making the framework of the vessel I form sections " of" wrought iron of "⅜ of an inch more or less in thickness." Metal tubes, either single or rivetted together, are then placed in the various sections to fill the space. They are then blocked with wood, and adhesive cement is run in to fill up any openings. After the wood is cut off flush the exterior is coated with wood or iron, first laying a coating of Clarkson's cork material, compressed with great pressure before the plates are left finished. "The same arrangements of my tubes ventilate and remove smoke " from between decks of the vessel by making one end of the " tube near the exit red hot, or to fix the tube through the cook-" house or other fire; this system is also applicable for ventilating " houses," discharging chemical liquids against an enemy, and extinguishing fire.

[Printed, 2s. 4d. Drawings.]

A.D, 1864, January 26.—N° 224.

CHRISTIE, Peter.—"Improvements in the building of wooden " ships, vessels, and boats." The invention relates to certain improvements in the construction of the hulls of wooden ships, vessels, and boats, and is for the purpose of imparting greater strength generally, especially at the parts which are usually the weakest, namely, the turn of the bilge and the junction of the deck beams with the frames at the top timbers. By this invention the risk of damage to cargo from deck and bottom leakage, as well as the liability to dry rot, is diminished, the latter improvement resulting from the increased air space amongst the timbers.

It consists, first, in making the frames, which are of wood, of a greater depth or thickness athwartships than at present, but of a less thickness in the longitudinal direction of the ship or vessel, which arrangement produces greater space for the bilge water, at the same time lessening the risk of its reaching the cargo.

2. In securing the deck beams to the frames by means of a *side plate or plates of* iron, steel, or other suitable metal in lieu of

the usual knees; and it is preferred to use iron or steel plates at the fore end and middle portions of the vessel, but in the after portion, plates of copper, brass, or other suitable material may be used, "for this being the neighbourhood of the compass, local " attraction is thus avoided."

3. In applying and securing a plate or plates of iron or other suitable material opposite to the second futtocks, by which the turn of the bilge is strengthened.

4. In the application of bolts for fastening the outside planking to the frames, the bolt passing through the outside planking into the frames, also through a coak or cog, which is partially sunk into both plank and frame where they are in contact.

5. In securing the outside planking to the inside or ceiling by bolts passing through the spaces between the frames, which bolts are made of iron or other suitable metal.

6. In securing iron or steel bolts or plates from rust by an insulating substance, which prevents the galvanic action on the iron resulting from coppering the bottom of wooden ships or vessels.

The insulation of the bolts may be effected in various ways. According to one system the holes are syringed with a solution of gutta percha, or the gutta percha may be introduced in any other manner that may be found suitable, and after the holes are become coated with this substance the bolts are introduced. Or, instead of this, the bolts are first dipped into some substance, such as a mixture of shellac and spirits of wine, or other solvent, or any other glutinous or other mixture or substance that may be found suitable, such as marine glue, pitch, tar, or a solution of india-rubber, and then introduced into the holes; or powdered shellac or other material may be first introduced into the holes in a pulverized state, whilst the bolts are put in warm, so as to melt the material, which, when liquid, will cover them, the chief use of insulating the bolts being for the purpose of, as far as possible, preventing them from rusting. After the bolts are thus inserted and tightened up, plugs of wood or other suitable substance are driven in over them.

The invention consists further, in the employment of iron knees or brackets similar to those which are used to support an ordinary shelf, these knees being attached by bolts to the under side of the deck and the inner side of the outside planking, their use being to increase the resistance to the caulking, and thus to prevent

leakage at the waterways and covering boards; and in the application of straps of wood or metal attached vertically to the inside of the outside planking at those portions situated between the frames, this arrangement being for the purpose of still further stiffening the outside planks by increasing their resistance to the disturbing influence of caulking, and thus increasing the longitudinal strength of the ship.

Another cause of weakness in the sides of wooden ships results from the method under which chain plates are ordinarily employed. From the fact of their being carried to only a short distance down the ship's side they possess a strong tendency to lift the planks above them from the lowest one; still so long as these chain plates are fixed to the outside of the ship there are practical objections to arrange them lower down, for when the vessel should list over from the pressure of sail they would drag through the water, and thus impede her progress.

According to this invention the additional thickness of the ship's side would allow of the required spread of rigging, without putting the chain plates outside, and it is preferred that they should be placed on the inside and taken far down; and they may in many instances be carried across the ship by a connecting plate, thus materially strengthening the hull.

Another improvement, according to this invention, consists in the application of plates of metal on the interior side of the butt joints of outside planking, so as to impart greater longitudinal strength to the hulls of wooden ships. These plates may be affixed by means of bolts or screws.

[Printed, 1*s*. Drawing.]

A.D. 1864, January 28.—N° 236. (* *)

JAMES, ENOCH WATKIN.—"Improvements in apparatus for "giving buoyancy to or raising sinking or submerged ships and "other sinking or sunken bodies."

The essential feature of this invention is the employment of tubes or cases, each furnished at or near one end with an opening or openings for the admission of water, in order to cause it to sink in such water when requisite, and furnished with a piston, which is moved towards the contrary end of the tube or case when water is so admitted. At this end of the case is connected a *small flexible tube*, through which air, or "buoyant gas or

"vapour," may be forced, the piston then being pressed back to the end of the cylinder at or near which are the holes, driving out the water from the case through such holes, and rendering the apparatus buoyant. In order to sustain the case in due form, when the water is driven out of it, moveable rings or frames are placed inside it, which are all forced to one end when the case fills with water, but are connected by chains to the piston and case in such manner as to follow the piston to a certain extent in its course when expelling the water. "Catches" may be employed for preventing the return of the piston until desired, and the holes in the case through which the water and air or gas enter and escape, may be furnished with valves.

In using these cases for raising a sunken body a number of them are lowered, by filling or partially filling them with water, down to the body to be raised, to which they are connected by divers, "or otherwise," and being then filled with air or gas through the flexible tubes, as already explained, become buoyant and rise, carrying up with them the sunken body.

The patentee describes different modifications of the apparatus, in some cases more than one piston being employed in the same tube, and states that, instead of such tubes or cases being "rigid," they may, if desired, be "flexible." He also mentions that to facilitate the raising of a sunken body the "first motion might be "given by exploding gunpowder (or other explosive substance) "beneath the same."

[Printed, 10*d*. Drawing.]

A.D. 1864, February 2.—N° 276.

CASTLE, William Henry Baldwin.—(*Provisional protection only.*)—"A new or improved composition for coating and insu-"lating metals, wood, cork, and other materials." The invention consists in the employment of a composition for coating and insulating metals, wood, cork, and other materials, consisting of gutta percha, india-rubber, or other analogous gums or compounds thereof, held in solution by the admixture of chloroform in the proportions of about one pound of gutta percha to one gallon of chloroform. It is preferred to add to this a small proportion of turpentine, say about one-sixth part of the volume of the chloroform employed, whereby the evaporation of the volatile constituents is sufficiently retarded.

" When this composition is applied as a coating to the sides " and bottoms of iron ships, and in other cases where it is in " exposed positions subject to the action of the atmosphere, " water, or other fluids or gases, I prefer to cover the coating " with a layer of paint composed by preference of red lead, " arsenic, and bichloride of mercury, but any other suitable " paint may be employed. When the surfaces to which the com- " position is to be applied are of a smooth nature, I prefer to " roughen the same in order to cause the composition to adhere " more firmly thereto."

[Printed, 4d. No Drawings.]

A.D. 1864, February 6.—N° 316.

McLAINE, ALEXANDER.—" Improvements in the construction " and equipment of vessels of war, parts of which improvements " are applicable to other vessels." The invention consists, first, in making comparatively low-sided armour-clad vessels of war more seaworthy in heavy weather, by erecting above their ordinary deck and armour a raised roof, with sides down to the hull (or what might be described as an additional story), constructed principally of iron, steel, or other metal, with or without wooden deck planking. This upper story is, by preference, secured to angle irons on the hull by screw bolts, with india-rubber slips for tightening joints, or by rivets inside, and made perfectly seaworthy. It is constructed to be wholly or partially removable before going into action. The sides of the additional story may extend downwards, wholly or partially, and be secured to bulwarks; it may or may not be continued along the whole vessel. The outer guns of the bow battery may be kept wide from the centre of the vessel, and the upper story may be so constructed that the portion in front of the outer guns would be separately movable, enabling the outer guns to be fired without moving the central portion of the upper story, by merely removing that portion in front of the guns.

2. In enabling the guns of bow and stern batteries, or the outer guns of batteries nearer amidships, pointing forward or aft in vessels of war, to be fired with their muzzles depressed. For this purpose, portions of deck and top sides in front of the muzzles, when depressed as aforesaid, are made movable, so that they may be taken away before going into action; the movable portions are, by

preference, secured by screw bolts to angle irons on the hull, with india-rubber slips for tightening joints. "I also construct the "top sides of vessels of war with recessed vacant spaces in front "of the muzzles of the outer guns as aforesaid when depressed, "without movable deck and top sides."

3. In enabling very heavy guns to be carried in vessels of war, and readily moved fore and aft to trim the vessel, and to be carried, if desirable, in a more central position in heavy weather. For this purpose, "I construct in a fore and aft direction, along "the decks of vessels of war, fixed rail or tramways for carrying "guns in such a manner that the ordinary roll of the vessel will "not make guns roll off the rails or tramways. By preference "I keep the rails wide apart, the gun low, and the wheels grooved "and angled outwards," "so that at the extreme roll of the "vessel in heavy weather a perpendicular from the centre of "gravity of the gun would fall within the rails."

4. In supporting rails or tramways so as to enable them to carry heavy guns, and withstand downward recoil when guns are fired, by supporting the said rail or tramways by one or more ranges of diagonal framework, sets of stanchions, or combination of stanchions and framework, by preference extending down to the bottom of the vessel; such diagonal framework being, if desirable, lengthened fore and aft, and constructed so as to increase the longitudinal strength of the vessel.

5. In making twin screw vessels more seaworthy in heavy weather, by constructing them with two distinct sterns separated at deck. By preference the displacement of the two sterns, when falling into a sea, is not to exceed that of an ordinary single stern.

6. In increasing the speed and seaworthy qualities of twin screw vessels by giving greater depth for working the screws, by constructing the keels of twin screw vessels with the lower line thereof crooked or bent down abaft, that portion beneath the screws being made lower than a straight line by at least nine inches.

7. In enabling very heavy port covers in vessels of war to be readily worked, by applying hydraulic power to them.

8. In increasing the accuracy of fire of heavy guns in vessels of war, by attaching to the after part of the guns or gun carriages a platform, seat, or steps fixed or movable, for the gunner to stand or sit upon while taking aim, and to remain thereon during the recoil, a rest being added, if necessary, for the gunner to lean

against and steady himself while taking aim and during the recoil. The movable seat may be connected to sliding bars to diminish the suddenness of the recoil, on the gun being fired, by sliding towards the gun, until checked by the force of coiled springs, there being a bar connected to the seat, formed with a ratchet, into which a paul is free to fall to retain the seat, and prevent any rebound from the action of the springs.

[Printed, 1s. 10d. Drawings.]

A.D. 1864, February 6.—N° 320.

SINIBALDI, Marie Celeste de Casteras.—" Improve-" ments in the manufacture of plates, tubes, cylinders, and other " articles, and for covering or coating the same with copper, " brass, or other metals." " In constructing a laminated or " compound plate of a number of layers of iron or steel, or of " iron and steel united by copper, brass, or other like metals, " instead of laying the iron or steel plates or sheets forming the " compound plates with their surfaces together, as described in " a former Patent granted to me, and placing them in the bath " of molten metal in that position, I place between them sheets " of copper, brass, or other metals, and after securing them " closely together I immerse them in the melted metal. The " sheets of copper or brass must be thoroughly cleaned as well as " the plates of iron and steel, and immersed in a solution of " borax or other flux before attempting to unite them."

" Another method is to coat each separate sheet of iron or steel " of which the compound plate is to be composed, with a thin " coating of the same metal as that in which it is to be im-" mersed, or the thin coating may be of a metal which melts " at a lower temperature than that forming the bath, so that " the compound plate need not be so long exposed to such a " high temperature.

" In the manufacture of plates for the construction of ships " or other like objects, I prefer instead of making short plates, " to be afterwards fastened together by rivetting or screwing, to " make a continuous compound or laminated plate which shall " extend from end to end or all round the ship or other structure " of which it is to form a part."

One mode in which a continuous plate may be made to extend all round a vessel or other structure is described as follows:— There are adjustable blocks which, for the formation of each suc-

ceeding plate, are held by nuts or otherwise in the desired position, corresponding with the section of the ship or other like object to which it is to be applied; a quantity of sheet iron or steel is then wound upon a roller or drum carried by a truck, supported upon rails. The truck is provided with toothed wheels, which take into racks, and traversing the rails, thereby coil the sheet iron or steel upon the adjustable blocks, until the desired thickness of plate is formed; the plate is then temporarily secured by rivets or otherwise, after which it is removed from the blocks and placed in a suitable mould, in which it is brazed by pouring the molten metal thereon, or by other suitable means. The strip of iron or steel to form the plate is cleaned and plunged in a suitable flux in the ordinary manner before coiling it up on the drum. The plate when formed may be placed in its required position on the vessel, and secured in any convenient manner. "Or a plate may be formed to extend from " end to end only of the vessel, when the plates would be simply " laid one upon another until the desired thickness is obtained, " and secured by rivets or otherwise, after which it is brazed as " previously described. In making tubes or cylinders I take a " sheet of iron or steel and coat it with a thin coating of copper, " brass, or other metal, and coil it up tightly upon a mandril, " which can either be removed or left inside as required, I then " secure the tube or cylinder, thus formed, firmly to prevent its " coming uncoiled, and subject it to heat either by immersion " in a bath of molten copper or brass, or other suitable means."

"For coating the surfaces of cylinders or tubes with copper, " brass, or other like metals, I first clean thoroughly the surface " to be covered and fix thereto a lining or covering formed of " a sheet or number of sheets, or a tube of copper or other metal, " also having its surface thoroughly cleaned, and secure them " firmly together, and after immersing them in borax or other " flux unite them by the application of heat."

In order to cause the union of the coating metal with the cylinder by heat, the cylinder is placed in a box, lined with fire-clay or loam, the two halves of which box are firmly secured together by rings, aided by cotters; discs or plates are then driven firmly in at each end until they abut against the ends of the cylinder. The box, with the cylinder therein, is then subjected to heat in a furnace, until the union of the copper or other coating metal with the cylinder is obtained.

Or, the surface of iron or steel is covered with a thin coating of the same or a similar metal to that which is to be united thereto, and after cleaning and immersing them in borax they are united by heat, as above described. The same methods can be employed for the coating of plates or sheets of iron or steel, for the construction of ships or for other objects.

[Printed, 2s. 4d. Drawings.]

A.D. 1864, February 8.—N° 325.

NAPIER, RICHARD HENRY.—" Improvements in the con-" struction of screw steamers for naval warfare." The inven-" tion consists " in constructiug flat-bottomed screw steamers " so that guns of heavy calibre can be worked with a lighter " draught of water than can be otherwise conveniently attained, " and for that purpose I construct such vessels with lateral " projections or bulges in their top sides, and give them a " sudden increase of beam extending for about twenty-one feet " before and abaft the centre, and terminating obliquely, to pre-" sent an angular surface to cause shot which may strike it to " glance off, and I form a gun platform in the midship part of " the vessel from which a cross fire could be obtained at thirty " feet ahead and astern, and by which the weights are thrown to " or towards the centre instead of the ends of the vessel, and I " have an elliptical roofing covered with iron or steel to protect " the crew while fighting their guns on the platform, and I work " the guns on tramways so that they may be the more easily " handled."

[Printed, 8d. Drawing.]

A.D. 1864, Februrary 9.—N° 335.

SALT, JOHN CLUTTON BLAIR.—" Improvements in protecting " iron ships and vessels from corrosion." The invention consists " in protecting iron ships and vessels from corrosion by coating " the iron plates of which the ship or vessel is built with glass or " enamel, and covering the rivets and junctions of the plates " with glass or enamel in the manner herein-after explained. I " coat or cover the iron plates of which the ship or vessel is built " with glass or enamel in the same way as hollow ware and " various articles of iron are now commonly coated, that is, either " by spreading on one or both sides of the cleansed plate pow-

"dered glass or enamel made into a pulp with water, or by "covering the plate with gum water or other adhesive matter, "and dredging or dusting the powdered glass or enamel thereon. "By the application of heat the glass or enamel is fused on the "plate and adheres firmly thereto. In building the ship or "vessel the plates are joined together by rivetting in the usual "way. After the rivetting of the plates has been completed, and "the junctions have been caulked, I fuse glass or enamel over "the heads of the rivets and over the caulking, and at the same "time repair the glass or enamel on the parts of the plates around "the rivet holes or elsewhere where it may be required; I effect "this covering of the rivet heads, and the caulking, and repair "the glass or enamel fused on the said parts, by means of a "blow-pipe. In this way the whole of the outside and inside of "the ship or vessel, or that part exposed to the corrosive action "of water, may be covered with a continuous or unbroken "coating of glass or enamel, and the iron of which the ship or "vessel is built effectually protected from corrosion."

[Printed, 4d. No Drawings.]

A.D. 1864, February 9.—N° 341.

TODD, BRERETON.—"Improvements in compositions to be "used to prevent the oxidation of iron, the fouling of ships' "bottoms and other submerged things, and also preserving wood "from decay and worms." "To prevent the oxidation of iron "and the fouling of ships' bottoms and other submerged things, "I use an alkali (potash or soda) compounded with asphalte, "pitch, tar, oil, or other similar substance that will cause it to "adhere," "and at the same time allow the compound to be "slightly soluble. I find that a useful alkaline compound is "produced by dissolving one pound of potash (or soda) in eight "pounds of melted pitch and then thinning the compound to "the consistency of varnish in the way usually adopted by the "varnish makers. This compound is applied, either cold or hot, "to the surface to be coated by means of a brush in the same "way as varnish is usually employed. This compound is parti-"cularly applicable for coating iron before applying to it a sheath-"ing of copper, but when copper sheathing is not employed, in "place of using the above compound alone, I prefer, in order to "render it more obnoxious to marine animals, to mix eight ounces

"of white arsenic or arsenic in other form with each gallon of "the varnish, or a similar proportion of oxide of antimony may "be employed. In some cases also I make a varnish or compound "containing sulphur." "By preference I dissolve one pound "of potash (or soda) in twelve pounds of pitch and then add "six ounces of sulphur and thin the mixture as before, so as to "make three gallons of varnish, this varnish may be applied by "itself in the manner already described, but I prefer to mix "these with four ounces of sulphide of arsenic, sulphide of "antimony, sulphide of copper, sulphide of iron, or sulphide of "zinc, or it may be a mixtures of these sulphides."

"To preserve wood from decay and worms, I employ arsenite "of potash or soda, or the antimoniate of potash or soda, or the "sulpharsenite of potassium or sodium, or the sulpantimoniate "of potassium or sodium, and I dissolve it in coal oil (which I "prefer to other solvents). I employ eight ounces of the alkali "compound to one gallon of coal oil, and force the solution into "the timber by well-known methods."

"I also use, in order to prevent the bottoms of ships and other "submerged things from fouling, the dehydrated sulphate of "copper, iron, and zinc, ground fine and mixed with bituminous "substances. I use one pound of the dehydrated sulphate to "ten pounds of bituminous varnish or coal tar."

[Printed, 4d. No Drawings.]

A.D. 1864, February 10.—N° 351.

SINIBALDI, Marie Celeste de Casteras.—"Improvements in coating with copper, brass, or other metals the surfaces of ships and other structures of iron or steel." The improvements relate to the "coating or covering the surfaces of the "sides and bottoms of iron vessels or other structures with a "protecting coat of copper, brass, or other metal. For this purpose the ship or other structure to be covered is placed on a "'gridiron' or other position where it can be kept perfectly "dry. The surface to be coated is then cleaned free from scale "or other impurities, and the copper, brass, or other coating "metal is applied and held to the surface to be coated, and by "the application of heat is fused thereon. For the cleaning I "prefer to employ some mechanical means, such as scraping or "rubbing, and for this purpose I propose to employ rollers "covered with emery or other substance of a like nature, the

" rollers to work in a moveable frame, which can be adjusted to
" the form of any part of the ship or other structure, the roller,
" spindle, or shaft to be connected by suitable gearing or by
" means of straps and pulleys to a portable or other steam
" engine."

" In some cases where it is necessary, such as in a very rough
" and uneven surface or a narrow opening or joint, I employ
" a process of 'pickling,' by means of vitriol or other acid
" diluted with water, taking care that the part is afterwards
" thoroughly cleansed from all acid before putting the coating
" thereon. When the surface is sufficiently cleaned I apply
" thereto a solution of borax or other suitable flux. It is made
" perfectly dry, and is then ready for receiving the coating of
" copper, brass, or other metal.

" For applying the coating to ships or other structures under
" ordinary circumstances, I employ a portable furnace," " which
" is supported on wheels and has a break applied thereto," " in
" order that it may be easily and quickly moved from one part to
" another of the surface of the ship or other structure being
" coated, by means of this furnace I melt the copper or brass,
" which is applied by pouring to the surface to be coated, which
" is previously made hot in order to prevent the molten copper or
" other metal from cooling by contact therewith before it is
" thoroughly fuzed thereon." " Each section or portion of the
" surface intended to be coated is previously surrounded with a
" covering of fire-clay or loam or other suitable substance, or a
" box or frame of iron, and means are to be used by which
" a stream of metal is made to flow through between the covering
" and surface to be coated till it is ascertained that a perfect
" adhesion has taken place."

" In some cases, instead of employing the portable furnace as
" above described, it may be found preferable to employ a
' stationary furnace of ordinary construction, and by means of
" suitable apparatus convey the molten metal in ladles or 'shanks,'
" as used in the ordinary work of a foundry.

" Another method is as follows:—After cleaning the surface
" and applying the borax as above described, I take a plate or
" sheet of copper or other metal of the thickness required and
" clean and apply borax to one of the surfaces thereof, which sur-
" face I apply to the clean surface of the object to be coated. The
" plate or sheet of copper or other metal must then be secured

" in its required position by means of an iron framing of a rect-" angular figure or of other shape, depending on the form of " the part of the vessel or other structure about to be coated. " This framing may be covered with fire-clay or other suitable substance and a sufficient heat applied at the back of the plate " or sheet by means of a portable furnace until the plate or sheet " is melted and caused to adhere."

" Another method is by means of the first-described method " to apply a thin layer of the coating metal, and then, in order " to obtain an additional thickness of the coating metal (after " cleaning the surface and applying borax or other suitable flux), " I place thereon a plate or sheet of metal as described in the " second method."

" The iron frame above-mentioned is so constructed as to move " easily from one part to another of the surface being coated."

[Printed, 2s. 10d. Drawings.]

A.D. 1864, February 16.—N° 395.

FULLER, WILLIAM COLES.—" Improvements in the method of " rendering doors and windows water-tight, especially applicable " to the port-holes and other openings on board ships and" vessels. The improvement consists " in the use of india-rubber " beading made of two distinct kinds of that material, chemi-" cally united in the process of vulcanising so as to form one " solid homogeneous substance. The flat surface for fixing is " of hard rubber, commonly known as 'vulcanite,' which may " be planed, mitred, drilled, or countersunk with ordinary " joiners' tools, and the projecting rib or bead is of the usual " elastic material of the very best quality. In most cases I prefer " to use for the elastic part the red rubber compounded with " golden sulphate of antimony, manufactured by Messrs. W. " Warne & Co., of Tottenham, because it resists oil better than " the ordinary grey rubber, and at the same time combines per-" fectly with the harder material. This well-known substance " (vulcanized india-rubber) is at present largely employed as the " best, if not the only material to effect the object, videlicit, " excluding sea water from port-holes, &c., and its use to a " certain extent is efficient, but the difficulty of obtaining a secure " fixing for so elastic a material to the surfaces of port lids, iron " doors, &c., is admitted by all practical engineers. The use of

"cement and rivetted plates as a means of fixing is not satis-"factory, and scarcely less so is the practice of using a flat sur-"face of india-rubber with a sharp metal V-piece opposite, which, "by indentation secures the parts in" contact "from leakage, "the almost invariable result of this arrangement being that "by unequal or violent pressure upon the hard opposing surface "the material is cut and damaged."

The present invention is designed to obviate both these disadvantages, first, by securing a firm mechanical fixing, and next by substituting for the cutting edge of metal, a rib or bead of india-rubber, expanding on a flat surface, by which means all danger or possibility of cutting is prevented.

"There are two methods in which my improved beading may "be applied to port-holes; one is to fix it round the edges of "the port-lid," "in which case it expands on the flat surface of the "recess," and the other method, which "on most accounts I "consider preferable, is to fix the beading in the recess," "and in "this position by keeping the recess a trifle deeper it will be "sufficiently protected. This arrangement also allows of the "port-lid being quite plain, and free from projections, and in "either case the brass V-piece and rivetted plates" are rendered unnecessary. "I prefer in most cases to fix the beading with "brass countersunk screws, on account of the facility with "which in the event of damage, by accident or otherwise, a "defective piece can be cut out and replaced; the screws may "be about two or three inches apart on alternate sides of the "rib, and each length should be bedded with thin white or red "lead." "What I claim as new and desire to secure by the "present Patent is, the employment of a rib, strip, or bead of "elastic india-rubber chemically united to a harder surface, "whether of vulcanite or brass," as described.

[Printed, 10*d*. Drawings.]

A.D. 1864, February 17.—N° 411.

COLES, Cowper Phipps.—(*Provisional protection only.*)—"A new apparatus to be employed in fastenings for armour "plates on ships, and in other like fastenings where bolts and "nuts are used." "My new apparatus is a conical washer, which "is inserted with the taper end foremost over the threaded end of "the bolt, and is screwed up by the nut. In some cases I make "the washer and nut in one piece."

[*Printed*, 4*d*. No Drawings.]

A.D. 1864, February 19.—N° 436.

PAGE, William Charles.—" An improved composition for " coating ships' bottoms." The object of this invention is to prepare a composition which, when applied to the submerged surfaces of iron ships, will prevent the adherence thereto of barnacles and other marine deposits.

" To provide a composition which will adhere well to the metal " and prevent its fouling, I take napthaline or the solid product " of the distillation of coal tar, known as the fat of tar, and by " the aid of heat I effect an admixture therewith of rosin oil and " animal fat, the proportions being, say, two parts by weight of " the naphthaline or fat of tar, one part of the oil, and one of the " animal fat. At a temperature of about two hundred degrees " Fahrenheit, and with gentle stirring, these substances will run " together, and having been well mixed I add thereto white lead " and flour of sulphur to give body to the mixture in the pro- " portion, say, of fifty-six pounds of white lead and twenty- " eight pounds of sulphur to one hundredweight of the fluid " compound.

" This composition I propose to colour by adding thereto oxide " of iron, arsenical green, or other suitable colouring matter.

" In applying the composition to the sides and bottoms of iron " ships, I bring it to a fluid state by subjecting it to heat in an " iron kettle, and by means of a common tar brush I pay the " composition over the surface which is intended to be submerged " or exposed to the sea water, repeating the application until a " good covering of the composition is secured."

[Printed, 4d. No Drawings.]

A.D. 1864, February 23.—N° 451.

HUGHES, Thomas James.—" Improvements in coating and " sheathing the bottoms of ships or other vessels." The invention consists in an improved mode of applying and fastening sheathing of well-known materials to the bottoms and sides of ships, and the object is principally to avoid contact of metal with metal.

" In sheathing ships (say iron ships), according to my invention, " I first cover a ship's bottom (or any part thereof) with gutta " percha, caoutchouc, or any similar material or combination of " materials. On this coating I place the copper (or other" sheath-

ing "**material, which may be Muntz's metal, yellow metal, " Gedge's metal, or other suitable metal or" amalgam), taking care to overlap "the end edges, which are prepared with underlap " and overlap, either by rolling or otherwise, that while I can " introduce a thin layer of gutta percha or other coating material between the laps, I do not in breaking joint cause any" unevenness "of surface in the sheathing, which, when completed, " presents an uniform and unbroken surface. To fasten the " sheathing in position I prefer to use screws which pass through " the laps of the sheathing metal, these laps and part of the ship's " bottom being so countersunk that the broad thread of the screw " may be passed home and leave no projection on the sheathing. " Before I put in the screw I place in the countersunk hole a " funnel-shaped piece of caoutchouc or other elastic material, so " that when the screw is driven home it becomes embedded in " this elastic substance, and does not touch the metal of which " the sheathing is composed. The head of the screw down to the " screw thread is enamelled with glass, porcelain, delf, or any " enamel. I may prefer but I do not confine myself to this " mode of securing the sheathing to the ship's bottom, some- " times using a wooden block or plug, and copper nail, or any " contrivance I may find answer the purpose of securely fasten- " ing the sheathing to the ship's bottom or sides."**

[Printed, 4*d*. No Drawings.]

A.D. 1864, February 27.—N° 491.

MUNTZ, PHILIP HENRY.—" An improvement or improvements " in the manufacture of yellow metal sheathing." The invention consists in mixing with the ordinary proportions of copper and spelter, which form the metal commonly called Muntz's metal, a small quantity of tin, by which an alloy is produced capable of being rolled at a red heat into sheathing for ships, and in which a considerable alteration of the metal takes place, so that whilst it is still subject to a sufficient degree of oxydation to keep the bottom of the vessel clean, it will be more durable than the yellow metal sheathing now in use, and which is composed of copper and spelter only.

" I find that the proportions of the several metals which pro- " duce the best results are sixty and one-quarter parts of copper, " thirty-nine parts of spelter and three-quarters of a part of tin,

" all these metals being in the purest state in which they can be " obtained. I use a sufficient excess of the proportion of spelter " to allow for loss in casting," " so that as nearly as possible the " proportions above named may be combined in the manufactured " sheathing. The alloy having been cast into ingots is then " rolled into sheets and prepared for use in the same manner as " ordinary yellow metal."

[Printed, 4d. No Drawings.]

A.D. 1864, March 18.—N° 695.

TOLHAUSEN, Frederick.—(*A communication from Charles de Bussy.*)—(*Provisional protection only.*)—"An improved pro-" cess for preserving iron from corrosion, as produced by the " influence of air and sea-water." "The means hitherto em-" ployed for preserving iron from any corrosive actions are based " either on galvanic processes or on the use of coatings intended " to resist said corrosive actions. When substances are thus " applied in a mechanical way to preserve the surface of iron " they offer a very slight adhesion. Moreover, in many cases, " according to the nature of the metallic oxide used for the coat-" ing, they will exert a direct corrosive action, such as takes place " with minium when applied to the hulls of iron-built vessels. " Acting upon these data, I have come to the conclusion that in " in order to obtain a most satisfactory result in preserving iron, " a coating must be used whose adhesion shall be the result of " chemical action on the metal itself. Amongst the various " matters that will fulfil this condition I prefer using the fusible " and insoluble chemical compounds, they both protecting the " surface of the iron, and filling up, by reason of their fusibility, " those imperceptible fissures and cavities which always occur in " wrought iron, owing to the porous nature of the metal, and to " the imperfections unavoidably arising from the forging process."

" The process which I consider the most simple and reliable con-" sists in subjecting the iron pieces to be preserved to the action " of phosphorus at a high temperature, so as to produce on their " surface a thin layer or coating of melted phosphide of iron. " This coating proves to be very adhesive, and is hardly acted " upon by the corrosive agents to which iron is commonly exposed " This operation may be effected by exposing the red-hot iron " *direct to the* vapours of phosphorus, but a more simple and

"economical way is by heating the pieces in cases or chambers "similar to those of converting furnaces imbedded in a brasque "or mixture composed of charcoal or coke dust, impregnated "with a solution of acid phosphate of lime. Pieces of a large "size may also be brought to a welding heat, and then be laid on "a bed of brasque composed as aforesaid and well dried and "covered up with the same materials. The heat radiated by the "piece is sufficiently powerful to cause the distillation of the "phosphorus, and its combination with the iron. This preserving "process may be advantageously applied in many instances, such "as for plate iron for shipbuilding, anchors, gun carriages, water "tanks, and so forth. It is peculiarly adapted for iron plating "or iron shields, for preventing the rapid deterioration of which "no efficient means has been devised hitherto." Instead of phosphorus, arsenic or antimony may be similarly applied.

[Printed, 4*d*. No Drawings.]

A.D. 1864, March 23.—N° 728.

ROUX, François Louis.—"An improved plastic compound for "the protection of metallic and non-metallic surfaces from the "action of water, air, and other causes of deterioration." This compound is prepared as follows:—"To a solution of ten parts "of caoutchouc in forty-five parts of essence of turpentine, I "add by small portions at a time an impalpable powder composed "of sulphate of barytes, sixty parts; sublimed sulphur, twenty-"three parts; white lead (ceruse) twelve parts. These ingredients "being thoroughly incorporated with caoutchouc solution, the "product is preserved for use in well-closed jars or other capacities; "it does not become completely homogeneous till from three to "four days after its preparation. The plastic compound, thus "formed, may in many cases be applied directly to the surfaces "which it is intended to protect, but as a general rule the latter "should be previously covered with a ground coating of minium "paint, or coal tar, or again (for iron), with metallic zinc de-"posited by one of the known processes. Over this ground I "apply a light coating of mordant, composed of coal tar, ninety "parts; pulverized resin, seven parts; litharge, three parts; and "when dry in about twenty-four hours after, I apply, by means "of a flexible spatula, the plastic compound first above described.

"A single coating of this compound is generally sufficient for the "preservation of surfaces which are not exposed to the action of "sea water, but for the hulls and armour plates of ships a second "layer is always required. To prevent the adherence of marine "plants, shells, and other organic incrustations the outer coating "may be sprinkled over with copper filings, either alone or com- "bined with powdered antimony or other metals or alloys capable "of resisting to a certain extent the action of the sea water. "The adhesion of these metallic filings to the plastic coating is "obtained by simply passing the hand over the latter within an "hour after its application, and if need be, beating it slightly "with a mallet when thoroughly dried. In certain cases it may "be found advantageous to incorporate the metallic filings with "the plastic matter before its application to the surfaces to be "protected. Or again, in the preparation of this matter the pro- "portions of barytes, sulphur, and white lead above laid down "may be lessened, and the difference be made up by equivalents "of other substances capable of preventing the incrustation of "the submerged surfaces. The hulls of wooden ships are "effectually preserved from vegetations, insects, etc., etc., by one "or two layers of the plastic matter, combined as above with "metallic or other poisonous ingredients. If so desired" a copper sheathing "may be applied to iron ships when coated with "the plastic compound, the interposition of which affords ample "protection from the contact of the two metals, and consequently "from voltaic action."

[Printed, 4*d*. No Drawings.]

A.D. 1864, March 28.—N° 764.

HILL, Edwin.—(*Provisional protection only.*)—"Improvements "in the construction of armour plates." "My invention con- "sists in constructing armour plates of alternate layers of iron "and steel, united by welding under rolls or hammers; or of "alternate layers of iron and steel produced by pouring into "suitable moulds alternate masses of those metals. The layers "in either method may run horizontally, vertically, or at an "incline, and in use the plates may be made to present the face "of an outer plate or edges of all of the plates; or vertical or "inclined plates may be welded to plates with horizontal seams."

[*Printed, 4d. No Drawings.*]

A.D. 1864, March 28.—N° 771.

SCOTT, MICHAEL.—(*Provisional protection only.*)—" Improve-" ments in constructing ships or vessels." " It has been proposed to construct ships or vessels with a complete skin of iron, " and to apply wooden planking both externally and internally, " this planking being secured by bolts through the whole. This " method of construction has not come into use, and is objection-" able principally because the vicinity of the copper sheathing to " the iron bolts will cause the rapid destruction of the bolts.

" Now according to my invention I employ an iron structure, " and combine therewith external and internal planking, which I " secure by means of wooden trenails driven through both the " plankings and through the iron structure, the iron structure " having holes formed in it to allow the trenails to pass through, " the two plankings are thus drawn together and nip the iron " structure firmly between them. The planking is caulked both " externally and internally."

[Printed, 4*d*. No Drawings.]

A.D. 1864, March 28.—N° 772.

REES, JOHN.—" Improvements in apparatus for the preservation " of ships, life, and property at sea, and on inland waters." " There are certain unoccupied cavities in all floating vessels, and " I render these available for the purposes of my invention by " constructing or forming india-rubber or gutta percha air tubes " or reservoirs of the same shape and dimensions, or nearly so, as " the cavities themselves. In ordinary or fair weather these tubes " or reservoirs are compressed so as to occupy as little space as " possible; but in anticipation of foul weather, or any danger " whatever, they are inflated partly by their own weight and " elasticity, and partly by means of force or air pumps and " bellows, so that thus filled with air they may take up as much " of the aforesaid unoccupied cavities as possible. I make the " decks of vessels to which the appliances before described are " applied air-tight and strong enough to bear, in case of accident, " the upward or supporting force or pressure of these air tubes " and reservoirs.

" To carry this part of my invention into effect I place between " the beams or spars under deck air-tight bags or cases, the size " of the cases being regulated by the spaces that may be found

" available. These bags or cases are by preference placed between " two decks, or, in other words, the bags or cases are secured to " the under side of one deck, and boards are placed beneath and " firmly fixed, thus chambers are formed to contain these aforesaid " bags or cases. When these cases are not in use they are drawn " up and fit close to the under side of the deck of the ship or " vessel; they are in communication, through pipes fitted with " cocks or valves, with air reservoirs, pumps, bellows on deck, so " that when the cases are required to be used the cords which have " drawn them up to the under side of the deck are released and " air is forced in until the inflation is complete. I make the " hatches or inlets to the hold from the deck perfectly air-tight " by means of vulcanized rubber nailed round all the hatches, so " that by applying lever pressure thereto no air can enter or escape " from the interior or hold. Tubes are led from the air pump, " or from the air chamber on deck to the various compartments " or cases that may be applied. Safety valves are also fitted to " the air reservoir on deck. I prefer to secure the upper part of " the bags or cases to the deck by copper nails. Now supposing " I fit these cases to the under side of the deck in a compartment " of a ship, one of the cabins, for example, I calculate the cubic " contents, and so regulate the number and size of the cases I " apply, but take care that when these cases are inflated that " they shall fill, or nearly so, the cabin before referred to. When " not in use they are secured by cords and hooks under the deck " quite out of the way; by releasing these cords the bags or cases " fall, and on opening different valves on deck they to a certain " extent become inflated, and the inflation is completed by the " air pump or bellows. By the adoption of appliances before " described a leaky ship can be preserved from sinking, and if " not damaged to a very great extent, her sailing qualities will not " be materially impaired, and if the deck holds together she will " never sink. A ship fitted with these cases can, in the space of " from ten to fifteen minutes, be put into a perfectly safe state, " and the air can be discharged when the danger is over in less " time than it took to inflate them.

" The second part of my invention consists in the construction " and employment of apparatus for saving life by providing for " those on board certain india-rubber cloth of double texture or " other water-proof coverings; these are made so as to cover the " entire body, *fitting* the limbs so as to admit of their use, having

" provision for light and respiration, and furnished at certain " parts with tubes or enlargements capable of being filled with " air according to requirements."

[Printed, 8d. Drawing.]

A.D. 1864, March 31.—N° 803.

MILLS, Henry Hohling.—" Improvements in constructing " the joints for iron or steel plates employed in ship-building and " other purposes where water-tight joints are required." " For " longitudinal or horizontal joints, which are usually lap joints, " I form in those parts of the faces of the two plates" " which " overlap or are brought into surface contact with one another a " groove," " so that when the grooves of the two plates " " are " brought into coincidence there will be a hollow space " " left " between the plates and parallel with the two lines of rivets; " this space " " may be made either rectangular," " or circular." " The space " " is filled with gasket, india-rubber, marine glue, " or other waterproof material, so that when the rivetting of the " two plates " " together is completed a perfectly water-tight joint " will be produced."

" For vertical or butt joints I make a groove, recess, or indenta- " tion " " down the centre of the covering plate." " When this " covering plate is placed over the butt joint," " there will be a " recess or space " " immediately above the joint and under the " covering plate, and this recess or space is to be filled with india- " rubber composition, gasket, marine glue, engineer's or other " cements, or other suitable waterproof preparation or composi- " tion which is capable of being poured in and will subsequently " solidify. Molten metal, such as lead, may also be employed for " the purpose, and when the covering plate " " is well rivetted on " to the plates " " a perfectly water-tight joint will be produced."
The operation of rivetting on the covering plate may also be made to drive the waterproof substance or soft metal into an angular space, between the edges of the plates, formed by bevilling off these edges.

[Printed, 10d. Drawing.]

A.D. 1864, April 2.—N° 824.

FITZMAURICE, James Terence.—(*Provisional protection only.*)—" Improvements in rudders." The invention consists " in

" constructing rudders with double sides, each carried out at an " angle with the line of the keel." The two sides are rigidly connected, and are made thus into one rudder, enclosing a considerable angular space between its sides.

[Printed, 6*d*. Drawing.]

A.D. 1864, April 5.—N° 847.

McLAINE, Alexander.—" Improvements in the construction " and ventilation of ships and vessels." " The object of the first " part of my invention is to construct a durable vessel with all " the strength and rigidity of an iron vessel, with the non- " liability to fouling of a wooden ship. This part of my inven- " tion consists in constructing ships and vessels with keel, stem, " stern post, frame, and outside planking nearly the same as an " ordinary wooden vessel, but instead of constructing the ceiling " or inner planking of wood, I construct it of iron completely, " connected by preference all round at bottom and ends of the " vessel, and made thoroughly water-tight, and with beams, " stringers, and keelsons of iron. The wooden frame is by pre- " ference of less size than usual in a wooden vessel of the same " tonnage, and is inserted between and bolted to angle irons " rivetted to the outside of the iron ceiling, or is fastened along " one angle iron rivetted as aforesaid, with or without the intro- " duction of perpendicular bent timber frames between the other " wooden frames. Iron plates if required for transverse strength " are fitted and bolted to wooden floors, and rivetted to the " angle irons aforesaid. The wooden outside planking or skin is " fastened with bolts or treenails, threaded or plain to the " wooden frame, and it may be sheathed over in the usual man- " ner with copper or yellow metal. The wooden frame may be " also fastened to the iron ceiling with threaded or plain bolts. " Steel may be substituted for iron in any portion of the con- " struction described. In order to keep the leakage of the vessel " from coming in contact with the iron of the structure I provide " space, clear of the iron aforesaid, for it to run down the inner " surface of the outside planking into the spaces between the " frames in the bottom of vessel, from whence it could be " pumped up by pumps extending down, through, and made " water-tight in, the iron ceiling."

" The object of the second part of my invention is the ventila- " tion of vessels described as aforesaid, and other suitably

"constructed vessels. This part of my invention consists in "driving air through the keelson or keelsons, thence through "apertures in it or them, into the spaces between the frames, "then up through the frame spaces, and out by apertures in the "iron ceiling at a higher level into the hold, the 'tween decks or "other portions of the inside of the vessel, or through apertures "communicating directly with the outer atmosphere; all or part "of the said apertures are, by preference, fitted with gratings and "adjustable covers to regulate the amount of ventilation. I "sometimes reverse the currents of air, and draw instead of "drive them as aforesaid."

[Printed, 8*d*. Drawing.]

A.D. 1864, April 5.—N° 849.

CORNISH, George Bishop.—(*Provisional protection only.*)—"Improvements in applying copper, yellow metal or other metal "sheathing to iron ships and other navigable vessels built of iron."

"The object of this invention is a means whereby copper yellow "metal or other metal sheathing can be applied to iron ships "and other navigable vessels built of iron, and consists, first, in "applying a sheathing of wood to the vessels' bottoms by means "of bolts or rivets, having their heads countersunk on the out-"side, and then covering the heads with wooden plugs, cement, "or other suitable material, so that no metal surface is exposed "on the the outer surface of the wood sheathing, and then caulk-"ing the seams, after which the external copper or other metal "sheathing is attached in the ordinary way. In some cases it is "preferred to place felt between the metal plating of the "vessel's bottom and the wood sheathing, or between the "wooden sheathing and the copper, or other metal external "sheathing, or both."

[Printed, 4*d*. No Drawings.]

A.D. 1864, April 7.—N° 871.

ADAMS, William Bridges.—(*Provisional protection only.*)—"Improvements in the construction and propulsion of vessels."

"I apply the external armour plates in a series of deep or short "steel or iron or other metal tubes, which may be circular or "square, or polygonal, or of any other desirable form in section, "and they may be in layers one above another, with or without

" supplementary plates between them and the vessels side, so
" that the structure will resemble in general appearance the cells
" of a honeycomb, and the tubes may be so formed as to yield
" elastically with a resilient action under blows by being barrel-
" shaped, or convex, or concave on the sides; and the whole may
" be connected together by bolts passing through the plates, such
" bolts passing through the centres of the tubes, or between pairs
" or clusters of tubes; and the tubes may be solid or formed
" with meeting edges unwelded or folding over each other, and
" the bolts which connect the plates and tubes may be curved or
" otherwise formed, so as to be elastic length-wise, the nuts being
" countersunk, and covering the screw threads to prevent break-
" age; and the hollow spaces may be filled with bitumen or
" asphalte, or similar substances covering the whole surfaces;
" and the tubes may rest on their sides in horizontal layers on
" shelves projected from the vessel's side so as to carry the armour
" plates, or in any other convenient mode. And this construc-
" tion will be equally available for forts or floating batteries."

The improvements in propulsion have reference to the use of liquid fuel.

[Printed, 4d. No Drawings.]

A.D. 1864, April 13.—N° 928.

EVANS, John Campbell, and THOMPSON, John Calvin.—" Improvements in preserving the bottoms of iron and other " ships and vessels." The invention consists " in protecting or " preserving the bottoms of iron and other ships and vessels by " applying thereto a composition composed of finely divided or " powdered copper and zinc, mixed together in any suitable pro- " portions, and incorporated with drying oils, varnishes, or bitu- " minous or other adhesive materials or compounds capable of " resisting the action of water. The proportions which we have " found to answer well in practice are, sixty parts by weight of " copper and forty parts by weight of zinc, mixed with shell-lac " and spirit to the consistency of ordinary paint; but these pro- " portions may be varied."

" When applying this composition to iron ships or vessels the " surface to be preserved should be first coated with any well- " known suitable non-conducting material, such, for example, as " pitch or naphtha varnish, over which the preservative metallic

"composition of the consistency of paint is to be applied, either "in a hot or cold state, with a brush or otherwise; or, if preferred, "the drying oils, varnishes, or bituminous or other suitable ad-"hesive compounds, or materials, herein-before referred to, may "be laid on to the surface to be protected, and the copper and "zinc applied afterward in the form of a dry powder, by sprink-"ling or dredging it over the surface before such surface has "become dry."

[Printed, 4*d*. No Drawings.]

A.D. 1864, April 13.—N° 929.

BURCHALL, John, and BORROWS, Edward.—(*Provisional protection only*.)—"Improvements in arming war vessels." "In "applying to such vessels an instrument of attack, which we "call a moveable ram, to distinguish it from the rams ordinarily "used, which are fixtures to or are portions of the vessel. Our "ram on the contrary is formed to thrust forwards like a punch "with rapid action, which may be repeated in a succession of "blows, so that if the vessel with this moveable ram be suffi-"ciently near an enemy's vessel, it will punch holes in it, and so "destroy it, or so bruise it as to render it leaky and unservice-"able; and we put the ram in motion by the agency of steam or "chemical gases, or air or water pressure, in any of the known "modes of applying power, or any convenient combination thereof, "and these rams may be applied above the water line or below it "in any convenient part of the vessel, stuffing boxes being pro-"vided when the rams are below the water line to keep out the "water, and the rams may be of any desirable section, round, "square, oval, triangular, or polygonal, and flatheaded, pointed, "or cupped."

[Printed, 4*d*. No Drawings.]

A.D. 1864, April 14.—N° 937.

STEVEN, Thomas, and BATTY, Charles.—"Improvements "in arrangements and apparatus for ventilating, for protecting "from heat, and for heating and cooking." This invention "relates to the producing or inducing of atmospheric or aëriform "currents with the aid of heat and otherwise, for ventilating, for "protecting from heat, and for heating, and to apparatus therefor, "and for applying heat in cooking."

For obtaining "inward and outward air currents or inward "currents only through the ceiling or roof of a room or enclosed "space, or through the deck of a ship, an apparatus is exter- "nally applied, being of a rectangular or other convenient form "in horizontal section. Two vertical passages formed in the "centre communicate below with the space to be ventilated, and "above with opposite sides of the apparatus, such sides being "fitted internally with various curved and inclined plates and "flaps, arranged so as to direct any impinging currents of air "into the inlet passage on the windward side. The vitiated air "escapes by the other passage or by separate apparatus situated "at a little distance."

[Printed, 1*s*. Drawings.]

A.D. 1864, April 15.—N° 954.

CLARK, William.—(*A communication from Louis Vincent Hein.*) (—*Provisional protection only.*)—" Certain improvements in the "construction of ships or vessels." This invention relates "to "the construction of ships and boats of iron and wood combined. "The vessel is to be built of iron plates with the " frames " rivet- "ted outside the plating so that the interior is flush and clear, "and the frames are to be made of angle iron with flanges inside, "or outside and inside, so that the same can be conveniently "secured to the plating by means of the inside flanges, and that "by the outside flanges the timbers used for filling the spaces "between the frames are firmly retained." The timbers are further secured to the frames and to each other by fore-and-aft bolts. "The timbers used to fill the spaces between the frames "run in the same direction with them, and they project outside "the frames, and are caulked. In each seam will be cut a "groove about one inch deep and two inches wide leading down "to a channel cut out in the bottom of the timbers and in the "keel as far as practicable, and from this channel suitable pipes "extend to a cistern placed in the bottom of the ship, and con- "nected to a pump; outside these timbers a planking is "fastened with composition, nails, and caulked. The ship is "coppered in the usual manner employed for wooden ships."

[Printed, 6*d*. Drawings.]

A.D. 1864, April 21.—N° 1004.

THOMAS, Luke.—(*Provisional protection only.*)—" A lifting " battery applicable to ships and forts." The invention consists " in a lifting and lowering gun platform for the working of " guns. On this platform (placed between decks in a ship, or " in a hollow sunk chamber in a fort) the gun may be loaded " and trained, and then run up with the platform to above the " deck of ship or parapet of fort, and fired 'en barbette,' and " then immediately run down, so that during the loading and " training of the gun, the men and the gun itself are protected " from the enemy's fire, and the liability to danger is greatly " diminished from the necessarily short time during which the " gun is exposed.

" I propose to effect the working of the platform by the appli- " cation of the pressure of steam, water, gas, or other elastic " fluid, and to do so in the following manner, that is to say :—I fit " to the piston rod or piston rods of a steam cylinder or cylin- " ders, hydraulic ram or rams, or cylinders of other apparatus " for applying fluid pressure, a platform or table whereupon the " gun is placed on a revolving carriage, and I so arrange that, " when the piston is at the bottom of its stroke, the platform " shall rest with its under side on the top of steam, hydraulic, or " other cylinder, in which position the gun is loaded, and when " it is desired to raise or lift the gun to the requisite height, the " pressure is admitted or applied on the under side of piston by " any convenient arrangement of valves, and the piston will be " thereby put into action, thus lifting or raising the platform and " gun."

When the invention is applied "to ships or gun boats, the " deck or decks is or are cut away to an extent equal to the size " of the platform, and vertical guide rods may be employed, " secured at their upper ends to the upper deck, and secured at " their lower ends to the lower deck, or otherwise conveniently " secured," "the platform being provided with grooves or " recesses at its outer edge in number corresponding with the " guide rods employed. This arrangement will serve to steady " and keep the gun platform in position during its upward " motion. The gun having been lifted or raised to its proper " position and discharged, the steam or other pressure is removed

" from under side of piston, and the platform returns to its " original position with its under side on the cylinder or cylin- " ders, when the gun can be re-loaded; or the gun can be run off " in case of its being disabled, and immediately be replaced by " another. The platform may be also used for mortar firing. " In heavy weather, or when for other reasons the guns are not " required on deck, they can be run off the platform, and the " platform run up close to the deck, and there securely locked."

" I propose in some cases," "to adopt fixed piston rods and " moving cylinders, and in these cases the platforms will be " attached to the cylinders instead of to the piston rods."

[Printed, 4*d*. No Drawings.]

A.D. 1864, April 22.—N° 1023.

NEWTON, William Edward.—(*A communication from Louis Michel Breysse.*)—(*Provisional protection only.*)—" An improved " apparatus for supporting ships or vessels in docks or basins " while undergoing repair." " The object of this invention is " to dispense with the use of the numerous props and struts " usually employed for supporting a ship or vessel in a vertical " position, and prevent her from bulging while undergoing " repair.

" To this end a kind of jointed framework or cradle is placed " in the dock, and the ship is floated into this cradle, and when " the water is removed from the dock the vessel rests upon the " cradle, the side pieces of which are moved up to and made to " press against and support the sides of the vessel. The side " pieces are moved forward by mechanical means, such as by a " rack-and-pinion motion, or by screws, or by hydraulic power."

[Printed, 4*d*. No Drawings.]

A.D. 1864, April 23.—N° 1033.

HOLDERNESS, Thomas Hunter, and JORDAN, Henry.— " Improvements applicable to the construction of ships or other " navigable vessels the hulls of which are built with metallic " frames and wood planking, part of which may be applied to " vessels constructed entirely of wood, or with wood frames and " planking and iron deck beams." The first part of this invention consists " in applying iron or other suitable metal in place of " timber in the construction of the waterways and bulwarks to ships

" or other navigable vessels the hulls of which are built entirely " of wood, or with wooden frames and planking, and iron deck " beams, or with metal frames, deck beams, and planked with " timber up to the gunwale."

In applying the invention to vessels built as above stated, " a " vertical stringer plate is carried round the outer side of the " vessel's frame, the upper edge of which is in line with the top " of the deck beams, or nearly so, and an horizontal longitudinal " stringer plate is carried on the top of the deck beams right " round the vessel, for forming the bottom of the waterway. " These two lines of stringer plates we rivet together by an angle " iron, or by having the edge of one line of plates turned to the " required angle. The horizontal stringer plate has rivetted " thereto two L or angle irons, which run parallel to each other, " one of which " lines " of angle irons may be used to rivet the " foot of the metal bulwarks to, and the other to receive the abut- " ments of the sides and ends of the deck planks. The lower limbs " on the L or angle irons we turn towards each " other, and place them sufficiently apart to form the waterway. The top of the bulwarks " we turn inwards, or rivet an angle iron along the upper " edge thereof, to which can be rivetted or otherwise attached a " wooden rail. The bulwarks we fit internally with metal stays, " the feet of which we secure to the inner line of angle or L iron " or other metal; or the plates forming the bulwarks may be " turned in at the bottoms to form the bottom of the waterway, " in which case the outer line of angle iron on top of the water- " way would be dispensed with; or the bulwark plates may be " extended sufficiently downwards to form the vertical srringers, " and be secured to the frame of the vessel, and the plates of the " waterways may be secured to the bulwarks by angle iron, or by " having the outer edges of the waterway plates turned at an " angle to allow of their being rivetted to the bulwark plates ; or " the vertical stringer plates may be carried sufficiently upwards " to allow the bulwark plates to be rivetted thereto. In place of " the bulwark stays herein-before described, stantions of angle or " T iron may be used.

" By this our improved system of metal waterways and bul- " warks herein-before described, iron or other metal may be used " in the construction of the poops and topgallant forecastles of " ships or other navigable vessels built of wood, or with metal " *frames and* wooden skins.

"Heretofore it has been customary to attach the wooden "planking of iron-framed vessels to the frames by means of bolts "and nuts, the bolts being driven from the outside, and the nuts "screwed on from within. Now this part of our invention con-"sists in driving the bolt from the inside, and rivetting them on "the outside, which not only facilitates the work of fastening, "but is less costly than when screwed bolts and nuts are used, "and will be found a far superior mode of fastening, as by this "improved arrangement the bolts can be the full size of the holes "in the metal frames, whereas the screwed bolts now used are "obliged to be of a less diameter than the holes through which "they pass to prevent the thread of the screw being injured in "driving."

[Printed, 10*d*. Drawing.]

A.D. 1864, April 28.—N° 1067.

PAPENGOUTH, CHRISTOPHER OSWALD.—"Improvements "in armour plating and in batteries of war." The invention relates, firstly, "to certain improvements in the application of "armour plating to vessels of war, batteries, and other defensive "structures, in order to enable such armour plating to resist the "penetration of either shot or shell; and, secondly, to improve-"ments in the construction of batteries of war for attack and "defence.

"I purpose, instead of attaching or fixing armour plates to "batteries and vessels of war with rigid and unyielding fasten-"ings, such as ordinary bolts, rivets, &c., whereby the plates are "held firmly in one position without their having any elasticity "whatever," to apply armour plates, so that when they receive a blow from a projectile the said plates shall yield to the force of the concussion by means of springs. "To the outer skin of the "vessel or battery an elastic substance or packing is attached, "such as india-rubber, gutta percha, or other suitable soft or "yielding material, of about two inches in thickness, more or "less; between this and the armour plating a space of one or "two feet is left, and the armour plate is held in position by "means of bolts, with a thread at both ends, capable of being "adjusted to the box or ring fixed to the ribs of the vessel at one "end and attached to the armour plate at the other; such bolts "being made on the telescope principle are separately enclosed

" within a powerful helical or spiral spring extending within the one " or two feet space left between the armour plating and the outer " surface of the skin of the vessel or battery." " A larger washer " or bearing plate may be placed at the end of the spring or on " the ends of the bolts, to enable the springs to take a firm bear- " ing while being compressed by the force of a projectile upon " the armour plates. The force or the elastic power of each spring " is proportionate to the weight of the plate.

" In order to make the plates more capable of yielding to and " resisting the shot, I propose to make the surface of steel plates " of Low Moor or rolled iron, and so small that each plate may " be on the outer surface from one to four square feet, more or " less, such plates to be fastened to the sides of the vessel or " battery by means of yielding or telescopic bolts, such bolts " being composed of two or more separate cylindrical prisms or " tubes entering one into the other, so that if the superficial pres- " sure is effected upon one end of the bolt the whole can be " diminished in length to half the whole former length or even " to less than the entire half of such length. By such means, if " the plate is pressed by any projectile, and yields under the " pressure of the same, the bolt by which such plate is fastened " to the sides of the vessel or battery will be diminished in its " length, the two or more parts of which such bolts" are " com- " posed having entered one into the other."

" The form of the armour plates will either be square or octa- " gonal, such plates will be arranged side to side, so as to cover " the whole surface of the vessel or battery, and in order to pre- " vent the water entering vessels of war plated according to my " improvements, and at the time the armour yields under the " pressure of projectiles, provision is made that each plate will " move inside of a square or octagonal chamber or recess fitted " accurately to the edges of the plates and covering the springs " placed behind the same; such chamber or recess can be made " of india-rubber, or composition of india-rubber mixed with " cork, or other suitable materials capable of being compressed by " means of such chambers or recesses made for this purpose, " each plate will be perfectly water-tight and separate" one " from " the other, so that when the plate yields under the pressure of " projectiles the water will be prevented from entering under or " between the plates into the vessel. In order to protect the " joints between the plates and to prevent any shot from entering,

" provision is made for protecting them by means of prisms or " pins or keys with half spherical heads, or even prismatical " heads, so arranged as to overlap what space is left between any " four plates and the pliable chambers or recesses connected " therewith, as previously described. Such prisms, pin, or keys " will move on a T-iron placed horizontally and bolted to the " skin or ribs of the vessel such pins or keys having a slot or " groove cut within itself and so adjusted on to the aforesaid " T-iron that it will move in the direction of the projectile by " which it is struck; it is quite independent from the armour " plate, so that when the plate yields to a shot the pins or keys " that protect the joint remain unmoved; but should the pin or " key be struck it would then yield and press inwards the four " plates surrounding the same."

"I propose to construct the battery of an elliptical or egg-" shaped longitudinal section, the ends being somewhat pointed. " The battery is made in three hundred and sixty longitudina. " divisions, ribs, or sections, representing, as it were, staves form-" ing portions throughout of the ever-varying transverse diameter " of the battery; each of these staves or sections must of course " be formed of such transverse section as to register together to " form the circle, and therefore their exterior segment will be large, " and their sides tapering inwards towards each other to form the " internal smaller segment. Here also the springs and screw " bolts are applied to the armour plate which constitutes the " exterior of the staves or divisions. Now in order to enable " these staves or armour plates to yield to the impact of a shot, " it will be necessary to leave a small space or opening between " such openings or spaces, serving also for the admission of light " and air to the occupants of the battery. In the construction of " a flat or curvilinear nature, such as the side of a vessel, the " plates may be placed edge to edge or in contact, but in an " elliptical form of battery the universal arched outline would " preclude the yielding of the plates if spaces were not left " between each; these spaces are sufficiently small to preclude " any chance of ingress of an enemy's missile or projectile. Now " in order to maintain these divisions or sections in position, I pro-" pose to apply to the interior of the battery three sets of dupli-" cate metallic rings, held in position by spring fastenings, one set " being in the centre or largest internal diameter, and another set

" at or near each end of the battery. The bolts passing through " the staves or sections are brought between and within each of " these double rings, and a conical or wedge point on the end of " the bolts serves to hold the entire series of staves or sections " securely to the rings; thus when a projectile strikes any point " or surface of the battery it will either glance away or be diverted, " or even if it should strike at a right angle to any point, the " armour plate will yield and exhaust the force of impact.

" Underneath the centre of the battery I arrange a circular turn- " table foundation, on which the structure is supported by means " of a central pivot or bearing, around which is a circular groove " or channel, in which a series of friction wheels or rollers travel; " these wheels may be toothed, entering corresponding recesses " in a toothed circular channel, and such wheels may be actuated " from the interior of the battery by means of a vertical shaft " and hand wheel, or by mitre wheel gearing, so that the gunners " may turn the battery in any required direction for discharging " the guns underneath the port. The battery derives support and " protection for the turntable and gearing by means of a shield " somewhat in the form of a rudder, but presenting angular or " wedge-shaped surfaces to the action of a shot. This shield is " made of armour plate exteriorly, and is provided with the " spring appliances, as previously described. Surrounding the " turntable there is fixed to the base of the battery a ring of a " conical section, the apex of which is lowermost; this would be " almost a sufficient protection to the turntable. The battery is " capable of being taken to pieces and put together with facility, " and is thus rendered portable, and may be " transported by means of " a few waggons. In one or both ends of the battery I place " a piece of ordnance of any construction, but by preference a " breech loader, the muzzle of which would extend into the " pointed extremity of the battery. Now in order to discharge " this piece of ordnance in the absence of an open porthole I " form the port of the small pointed ends of the sections by " attaching with hinges or joints to the fixed sections, so that " the explosion and exit of the projectile shall suddenly open the " port; immediately after which, by means of springs to each " section, the port will close together again and render the battery " secure from ingress of the enemy's fire."

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1864, April 28.—Nº 1069.

NOTMAN, Alexander.—"Improvements in hinges for ships' " ports, skylights, and other purposes." "Hitherto in fitting " ports to ships, especially in circular parts, great difficulty has " been experienced in setting the hinges carrying the ports at " corresponding angles."

This inveution consists "in the construction of a hinge capable " of being set at any required angle. I make the strap of the " hinge in a piece with or connect it to a ball, which may be solid " or hollow. The ball works in a socket formed by jaws, which " I prefer to cast on to the knuckle or hinge plate, but they may " be rivetted or secured in any other approved manner. The " knuckle or hinge plate is secured to the place where the hinge " is to be attached, to a ship's side or stern for example."

The invention may be applied with equal facility to other purposes where hinges are used.

[Printed, 10*d*. Drawing.]

A.D. 1864, April 29.—Nº 1084. (* *)

BROWNE, John Collis.—"Improvements in the means of " and apparatus for raising vessels and other sunken bodies, " which improvements are also applicable to stopping or plugging " holes in ships."

For raising sunken vessels certain flexible waterproof bags are employed, each of which is furnished with two openings, through one of which certain materials may be introduced into the bag, while they may be withdrawn through the other; these openings being provided with suitable pipes, and the former with an union joint and a "valve or regulator," the latter being merely furnished with an ordinary tap or cock. Through the opening furnished with the valve is introduced a quantity of alkaline substance, and a hose pipe is then connected to that part of the apparatus which passes to a "diffusing chamber," with which is connected a pipe proceeding to a force pump, or to a second chamber in connection with such a pump. In raising the sunken vessel a number of these bags containing alkali are carried down in a collapsed state and attached to the vessel by a diver, and diluted sulphuric or hydrochloric acid is then forced down into the bags from the diffusing chamber or chambers by the pump, the action of the acid or *other substance* upon the alkaline matter causing the bags

to become quickly inflated with gas, and the buoyancy of the bags, when thus inflated, raises the vessel to the surface.

For plugging a hole in a vessel one of these bags is passed through the hole in a collapsed state, and on becoming inflated fills such hole, and so prevents "the rush of the water into the " vessel."

[Printed, 6d. Drawing.]

A.D. 1864, May 5.—N° 1135.

HENSON, HENRY HENSON.—" Improvements in armour and " other plating and sheathing for ships or vessels, partly applic- " able to other purposes." " One of my improvements in armour " plates consists in forming the pile or faggot of the same of " several plates placed upon each other, and having milled or " ridge and furrow surfaces, so that on being welded or rolled " together, (suitable fluxes being used in order to secure clean " welded surfaces,) the ridges of one plate fit into the furrows of " the plates above and below it, and the whole of the plates there- " by become more firmly united together than where the pile is " formed of plates having flat surfaces, or is otherwise faggotted, " and consequently less sound."

The invention consists, secondly, " in forming on the outside of " armour and other plates for ship-building or other purposes a " milled or small ridge and furrow, or corrugated surface, and in " filling the furrows up flush, and in somecases over the ridge with " suitable bituminous, resinous, or other compounds, such as " liquid asphalte, Hays' or marine glue, or solutions of india- " rubber, gutta percha, and similar materials. Such coating is " made to cover the ridges formed on the plates so as to protect " the entire surface of the iron plates from the action of the sea " water, or in cases where copper or yellow metal sheathing is " employed to prevent or lessen the danger of galvanic action " taking place."

3. " In covering the armour or other plates or metal sheathing " plates of vessels with one or more layers of thin wood, veneer, " or scaleboard, (which may be creosoted or waterproofed) " cemented to the surface of the vessel by means of marine or " Hays' glue, or other suitable cementitious substance. In order " to insure the more perfect adhesion of such thin wood sheath- " ing to the surface of the vessel, either the former, or the latter,

" or both, may have previously cemented to them a thin canvas " called 'scrim,' or asphalted or tarred paper, papier maché, felt, " or other similar materials of a fibrous nature; and the outer " surface of such thin wood sheathing may be coated with the " hard compound of india-rubber and sulphur called vulcanite or " ebonite, whether made separately and cemented on, or made on " the wood itself, by spreading the combined elements thereof " (the composition of which is well known) before being heated " on the wood or on the scrim to be cemented thereto, and then " heating the wood or scrim so coated to the required degree, say " from 230° to 300° Fahrenheit. Instead of such thin wood " sheathing, I make use of kamptulicon (by preference, containing " balata, a gum having similar properties to india-rubber) or " sheet cork or leather for that purpose, to the back surface of " which scrim is cemented; or I employ common felt or as- " phalted paper, or the like, on the outer surface of which a thin " layer of kamptulicon is cemented; or scrim coated with ebonite " may be employed, whether cemented on or whether the elements " of the ebonite are spread upon the prepared scrim while in a " plastic state, and then subjected to the necessary heat."

4. " In the manufacture and employment of an improved " ebonite or vulcanite sheathing for ships by employing for that " purpose ebonite containing in addition to the usual ingredients, " an optional proportion of balata, whereby the ebonite sheathing " is made cheaper and tougher than heretofore. In order to cause " such improved ebonite, or the ordinary ebonite sheathing, to " adhere more perfectly to the surface to which it is to be cemented, " I roughen or indent its back surface to form a 'key' or means of " securing. I also combine with such ebonite sheathing a layer " or surface of gutta percha, prepared scrim, kamptulicon, sheet " cork, leather, or felt, Clark's felt or asphalted felt, cemented " to the back surface of the same; or I insert a layer of any of " the before-mentioned materials between two layers of ebonite, " and in some cases I cement or otherwise combine a sheet of " ebonite to a sheet of vulcanized india-rubber, with or without " a layer of fibrous materials intervening, thus producing a fabric " the surfaces of which are of different degrees of hardness."

5. "In coating sheathing plates whether of Muntz's metal, " copper, iron, or other metal, as also armour or ship's plates in " any stage of or after their manufacture with a layer of ebonite " or its *equivalents, for* which purpose I by preference first

"roughen or mill the surface of the metal plates, and in some "cases I also suitably perforate them, and I then spread the com- "bined elements for forming the ebonite" "on such roughened, "smooth, or perforated surface, and heat the same to the re- "quired degree for forming the ebonite or hard surface," "when "it will be found that the ebonite will adhere firmly to the metal "plates."

6. "In an improved method of fixing wood sheathing to the sur- "faces of armour plating without its being requisite to make "holes in the armour plates for securing the same. For this "purpose I form the heads of the bolts that secure the armour "plates either hollow with a female screw cut in them, or I form "a projecting screw on the heads, and I then secure wood battens "(by preference previously creosoted or treated with marine or "Hays' glue) to the armour plates by means of bolts screwed "into the hollow heads of the armour plate bolts, or by means of "nuts screwed on to the projecting screws which pass through "the battens. The spaces between the battens I then by pre- "ference fill up flush with wood sheathing, or with a mixture of "cementitious, bituminous, and fibrous materials, and I then "secure to the battens the wood sheathing, which may or may "not be covered with metal or other sheathing such as before "mentioned, and in some cases I attach such metal, vulcanite, "or other sheathing to the battens without the intervention of "wood sheathing, taking care, in cases where metal sheathing is "used, that the spaces between the battens are filled in with in- "sulating materials so as to prevent galvanic action from taking "place."

7. "In forming spaces or grooves in the surface of the armour "plates for the reception of small iron troughs, into which are "fixed strips of wood, by preference previously indurated and "compressed, to which the wood, metal, or other sheathing may "be fixed."

8. "In making the outer surface of the armour plates of a "ridge and furrow or grooved form, and in filling the furrows or "grooves in with pieces of timber, or other suitable materials "such as before mentioned, either cemented or otherwise fixed "to the armour plates, thus forming a flush or even surface upon "the iron, and thereby protecting the armour plates from the "action of the sea water, and to a certain extent impeding the "*action of* projectiles. If required such surface may be further

" covered with any description of sheathing, the pieces of wood " or other suitable materials affording a convenient means for " fixing the same."

9. " In providing yellow metal, copper, iron, and other metallic " sheathing with an insulating covering on one or both sides, by " first roughening or milling the metal plates to increase their " powers of adhesion, and then covering with or cementing to " the same sheets or plates of any suitable insulating materials " in a plastic or other state, such as ebonite or vulcanized india-" rubber in any stage of their manufacture, sheets of gutta percha, " wood, cork, kamptulicon, prepared felt, leather, paper, papier " maché or other similar materials having insulating properties. " In some cases I first fix or cement flat strips of wood, cane, or " other similar material to the edges of or across the surface of " the plates, and fill the spaces between the strips in flush with " suitable insulating cementitious materials or compounds, such " as Hays' or marine glue, or prepared asphalte, with or without " fibrous materials; or I cement or fix to the surface of the " plates pieces of cane seating, and fill in the interstices of the " same with the before-mentioned cementitious insulating ma-" terials. Furthermore, in order to cause such insulating " materials that are put on to the plates in a plastic state to " adhere firmly to the same after the application of the proper " heat, I sometimes form perforations, holes, or slits in the plates, " through which the insulating materials when in a plastic state " are pressed, thus uniting the two coatings of insulating material " on either side of the plate; or when only one side of the plate is " to be so coated with such insulating materials, I countersink or " enlarge the perforations, holes, or slits on the other side of the " plate, so that the insulating material is, as it were, dovetailed " into such holes."

10. " In fixing the wood, metal, or other sheathing on to the " armour or ship's plates by means of nails, plugs, or screws, " driven into plugs of wood, cane, or other suitable insulating " materials inserted into the heads of the bolts that fix the ar-" mour or other plates, the heads of which bolts are made hollow " in order to receive such plugs of wood, cane, or other suitable " insulating material. Around the slightly projecting ends of " such plugs of wood, cane, or other material, I secure pieces of " sheet cork, kamptulicon, ebonite, or other suitable insulating " material, in the shape of a washer, to act as a surface cushion

" for the metal sheathing plates, so as to prevent all contact between them and the armour or ship's plates, and in order the more surely to effect this, I prefer to coat such armour or ship's plates with Hays' or marine glue to a thickness equal to that of the pieces of sheet cork or other material, and in some cases I also cover the surface of the armour, ship or other plates, as also the sheathing plates, with scrim or other similar open fabric in order to cause the sheathing to adhere more firmly to the armour, ship, or other plates."

" In another arrangement the edges of the sheathing plate are bent back so as to form flanges, and made to fit into grooves formed in strips of wood that are cemented or secured to the armour or ship's plates by any of the means before mentioned."

[Printed, 1s. Drawing.]

A.D. 1864, May 12.—N° 1208.

DWYER, Robert Doyne.—" Improvements in apparatus for cleaning the bottoms of iron and other ships and navigable vessels." The invention relates to " cleaning the bottoms of iron and other ships and vessels either when afloat or in dock, by apparatus worked from the deck, substantially in the manner set forth in the Specification of an invention for which I obtained Letters Patent bearing date the Eighteenth day of September, A.D. 1863, N° 2292. The short stroke, reciprocating or alternating motion, causing different parts of the apparatus to travel or rub over and clean in vertical lines, or nearly vertical lines, part of one or both sides of a ship from the keel to the load water mark.

" The apparatus consists of one, two, or more flexible ropes, chains, bands, or webs with scrapers, brushes, or cleaners attached thereto or thereon at short distances apart, and such apparatus is made sufficiently long to reach from the keel to the load water line on one or both sides of a ship. The modification which I prefer to use is intended to clean both sides of a ship in lines as above mentioned at the same time. The apparatus is made to travel from stem to stern, or vice versa, by ropes attached to the said apparatus and operated or hauled in on deck. Two ropes are placed parallel to each other at distances apart varying from six to twenty-four inches according to the size of the ship to be cleaned, and at distances apart,

"varying from twelve to thirty-six inches, there are secured "thereto boards or plates, say of timber, to serve as foundations "for the scrapers and brushes. To one of the flat sides of each "of the boards or plates there is attached a metal scraper pre- "senting its edge to the side of the ship, and having both of its "ends bent and bevilled off, so that when in use it will ride over "the plates' lap joints both in the up and down motions. On "the other sides of the said boards or plates brushes made of "coir or other fibre are attached. By this arrangement either "the scrapers or brushes can be used. To prevent friction at the "keel a breech or keel piece with rollers therein may be used, "but I have found that two block pieces one at each side of the "keel with chains or ropes attached to the lowest parts thereon "so that they do not touch the keel, answer the purpose."

[Printed, 10*d*. Drawing.]

A.D. 1864, May 18.—N° 1255.

GRÆME, Patrick St. George.—(*Provisional protection only.*) —"Improvements in ships or vessels for war and other purposes." The invention consists, in one part, in constructing the hull of an elliptic, or other similar flat transverse sectional form, in such a manner that the width of the vessel will be considerably in excess of its height. Both ends of the vessel terminate in points, being formed of an approximating conical shape, and may in some cases be arranged to act as rams. The centre of the hull of the vessel, for about one third of its length, is sunk to such an extent below the bottom surface of the other part, as to serve, with the engines and water compartments, as a counterpoise to the cupolas or turrets and armour plating that may be placed above the upper surface of the hull, so as greatly to obviate the enormous strain to which armour-plated vessels, as at present constructed, are subject, as also to increase the stability of the vessel. This construction of vessel may also be applied with advantage to vessels for mercantile purposes.

"The vessel is propelled by preference by means of apparatus such as described in the Specification to certain "Letters Patent, for which application is now being made by myself and Hugh Forbes, bearing date the 18th day of January "1864 (N° 137)." The vessel is, by preference, entirely closed in, and when intended for war purposes is provided with one or more

turrets or cupolas, either fixed or revolving, and is covered above water line, and to a certain extent below the same, with armour plating, which need only be of a slight thickness at the top of the vessel, and may gradually increase in thickness towards the sides of the same.

"The shield with which the vessel is covered by preference "is composed of a layer of teak or other suitable material "lying on the outside of the skin of the ship, on which is "placed a cellular iron structure, the cells of which may be plug-"ged with any suitable hard wood or other substance, and the "whole is covered by a plate of rolled or wrought iron, which "may be steeled in from the outside if found desirable. The "armour plating may be put on either in the form of flat plates, "or in the form of ribs having a circular, semicircular, or trian-"gular transverse sectional form, either solid or hollow, and "filled in with wood or other suitable materials, which ribs run "in a transverse direction over the vessel. Or the shield may be "formed of water enclosed in an india-rubber or other suitable "casing, which may be backed or covered with wood, iron, or "other suitable materials. The steering of the vessel is effected "by means of one or more rudders placed in such positions as "may be found most desirable for the proper management of "the vessel in water, and projecting below the bottom of the "vessel, by preference to rather less extent than the before-"mentioned sunken portion of the hull; the lower pivots of "the rudders are supported by means of a framing attached to "the bottom of the vessel, or they are placed in apertures left for "that purpose in the keel, which runs fore and aft of the sunken "portion of the hull, and the rudders are so formed that the "pivots upon which they turn are placed in a line that passes "through the centre of gravity of the rudder or nearly so, so "that the pressure of the water upon them is always nearly in" equilibrium "in whatever position they are placed." "If the "vessel is provided with a central turret or cupola for war pur-"poses, I arrange the chimney from the engine room to pass "through the centre of the same, and there surround it by an "outer casing covered with armour plating that will both pro-"tect the chimney and serve as a cover to protect the guns and "men in the turret. At the top of the turret or turrets I propose "to fix a series of wrought-iron bars, either solid or hollow, or "partially so, and so formed and arranged as in a great measure

" to protect the men and guns in the vessel from an enemy's " fire, as also to serve as a framing for a covering in unfavourable " weather.

" I also propose to construct ' iron-clad borer boats,' in contra- " distinction to iron-clad gun boats, on the principles above " described, such being armed with a powerful rotating steel " borer projecting from one or both ends of the same, such borer " being by preference of an oval or spherical form, the surface of " which would be covered with a series of sharp points or teeth, " or the borer may be of a pyramidal or conical form, with sharp " projecting edges running from the apex to the base. These " borers are for the purpose of boring holes through the sides of " vessels below the water line, the propeller of the boat being put " in motion the while for the purpose of obtaining the necessary " pressure for doing so. Should the borer bits be found liable to " break when in the vessel, it is proposed to connect the same by " means of a wire rope to the borer shaft, so as to draw the " broken pieces out on the retreat of the borer boat."

[Printed, 4*d*. No Drawings.]

A.D. 1864, May 21.—N° 1285.

COLES, Cowper Phipps.—" Improvements in protecting the " bottoms and sides of wooden and iron ships and other sub- " merged structures." The invention consists " in means of " affixing to the bottoms and such portions of the sides as are " liable to be submerged of iron and wooden ships, caissons, and " like structures, cements, mortars, stuccos, and concretes, or " other like substances. In wooden ships and structures I first " drive nails, brads, tacks, eyes, spikes, or other like holding " agents into such portions of the structure as are to be protected " at about one inch apart, more or less, and having about half an " inch protruding. The holding agents can be driven in at an " incline, or they may be more or less bent after having been " driven in. The cement or other substance or composition is " applied after the holding agents have been inserted. With iron " ships and structures I first apply a light sheathing of wood to " receive the nails or other holding agents, and I then apply the " cement or other like protecting substance or composition. Or " I sometimes cause studs to be rolled or formed on the plating " *for iron ships and other* iron structures, and use these studs as

" the agents for holding the protecting substance or composition
" Or I fix on a thin metal plate by means of screws tapped into
" the ship's sides or bottom proper; this plate before being put
" on, has flaps cut in it about half an inch square, and about one
" inch or one inch and a half apart. After the plate is on I turn
" these flaps up at an angle of about 45°; these flaps or portions
" of the plate so turned up take the place of studs or nails for
" holding on the cement or other protecting substances."

[Printed, 4*d*. No Drawings.]

A.D. 1864, May 25.—N° 1304.

WIMSHURST, Henry.—" Improvements in fitting screw and " similar propellers for propelling ships and vessels." This invention consists in fitting " screws and similar propellers in such " manner that greater facilities are given to raise the propellers " out of the water, also freeing the vessel from dragging the " posts and other parts through the water. The screw or other " propellers not only work abaft the rudder, but the same arrange- " ment will apply to those worked or placed one under each run " of the vessel, and " they " are so arranged that when desired " they " are capable of being raised with the aftermost length of " shafting," which assumes " an angular position, the propeller " being then under the stern of the vessel out of the water, and " for such purpose a long slot the size of the shaft is constructed " on either side of the vessel through which the propeller shaft " passes, and a trunk which is also constructed and made water- " tight; at the foremost end of the trunk there is affixed thereto " an improved stuffing box made to move on trunnions so that " the shaft which passes through when it is being raised will " cause the stuffing box to oscillate. When the after-piece of " shafting is lowered on its bearings then it will form one " continuous length secured together without knuckle joints."

[Printed, 10*d*. Drawing.]

A.D. 1864, May 28.—N° 1327.

THOMAS, John.—(*Provisional protection only*.)—" An improved " paint." " My improved paint is composed of copper slag " ground to a fine or impalpable powder, calcined or not, and " ground up with oil in the ordinary manner of mixing paints. " When used without calcination a dark colour approaching to

" black is produced, but by calcining the powder, red and brown " hues, according to the degree of calcination, can be obtained. " The paint is particularly applicable for protecting the bottoms " of iron and wooden ships, and all structures exposed to sea " water; it is also applicable as a general paint."

[Printed, 4d. No Drawings.]

A.D. 1864, June 9.—N° 1432.

OLDRIDGE, Robert.—" Improvements in the mode of work- " ing the rudders of boats, ships, and other vessels." The invention relates " to obtaining a greater command over ships' " rudders than has hitherto been obtained, and consist of apply- " ing and working two or more sets of gear attached to one " or more levers on the rudder, and all worked by two or more " helm wheel barrels fitted in a frame and working together " by means of cog wheels or other suitable appliances, and by " which arrangement of parts, though one-half of the gear " should break away, command of the rudder is maintained by " the other half.

" One of such improvements consists in attaching a cross-head " lever to the rudder head of the vessel, each end of the lever " being formed into a pulley block with two sheaves. A rope is " attached to one arm of the lever, and then passes over a pulley " secured to the deck on the right of the said lever, returning " and passing over one of the sheaves in the pulley block at the " end of the lever, and again passing over a pulley attached to " the deck alongside the other pulley, and thence to one of the " barrels or drums of the helm wheel to which it is attached. " Another rope is secured to the same arm of the lever, and then " passes over a pulley secured to the deck on the left of the said " arm of the lever, returning and passing over the other sheave in " the pulley block at the end of the lever, and again passing over " a pulley attached to the deck alongside the last-mentioned sin- " gle pulley, and thence to the other barrel or drum of the helm " wheel to which it is secured. Ropes are applied in like manner " to the other arm of the lever and to the barrels, and by these " arrangements a pull is obtained upon each end of the lever at " one and the same time in the direction in which the rudder is " required to be moved. The drums are connected and worked " together by cog wheels."

[Printed, 10d. Drawing.]

A.D. 1864, June 11.—N° 1450.

WALKER, AUGUSTUS. — (*Provisional protection only.*)—"Im-
" provements in the construction of steam and sailing vessels
" for naval and merchant service, and in the mode of arming and
" working the same." The invention consists chiefly "in con-
" structing vessels with one or more arches or truss frames applied
" longitudinally in the centre of the hull; in the peculiar form
" of the bottom; in the peculiar mode of armour plating vessels;
" in the novel construction of the prow; in the peculiar manner
" of mounting and sustaining the turret; in the device for"
ventilating "the interior of the vessel; in the novel construction
" of a movable pilot house, and of a device for raising and
" lowering the same; and in the mode of working and securing
" the anchors.

" At or near the centre of the vessel is placed an inverted and
" a corresponding direct arch, both terminating at each end at a
" king post placed near the bow and stern. Vertical frame pieces
" or posts are fixed near the longitudinal centre of the vessel,
" and to those posts are firmly fixed the said arches by means of
" metallic rods or other suitable device, so that the whole will
" constitute a truss frame of the greatest strength and rigidity,
" and thereby preventing injury to the vessel when supported by
" the ends or solely by the centre. The bottom of my improved
" vessel is constructed with a central keel, on each side of which
" is a concavity, and on the outside of each concavity a straight
" and nearly horizontal surface from near the stern to near the
" stem. The prow is constructed of iron or steel, and is arched
" both vertically and horizontally. To give it sufficient strength
" to prevent injury when used as a ram, an arch extending from
" one of the central parts before-mentioned to the extreme bow
" encloses and protects the prow. To better adapt it to sustain
" a crushing strain, and at the same time avoid unnecessary
" weight, the interior of the prow is filled with timber. The
" external shape of the prow is such that it does not interfere in
" any manner with the correct lines of the vessel. When designed
" for naval purposes the vessel is provided on its exposed parts
" with a metallic armour, which consists of two straight plates
" with a corrugated plate between them. The corrugations are
" filled with india-rubber or other elastic materials." "The shot-
" proof turret is placed near the centre of the vessel, and is sup-
" ported upon or within a casing. The turret may be constructed

" to revolve, or it may be stationary and permanently secured to " the said casing or foundation, and pierced with ports at suit- " able distances. I prefer however to construct the turret in " two parts, the lower part, constituting the gun carriage, being " made to revolve, while the upper part remains stationary. The " dome or upper part may be supported on separate ways to " permit its rotation independent of the lower part; or both " parts may be connected at any time by means of screw bolts or " other suitable device. The casing is constructed in the form " of a circular arch, giving great strength vertically and horizon- " tally. This arch may be surmounted by a rebate to support the " revolving parts. The required" ventilation "of the turret is " provided by means of two or more tubes extending from " either side of the vessel inwards and upwards in a curved form " to the interior of the casing. A series of apertures are made " in the turret on a level with the inner end of the tubes, so as " to admit fresh air into any portion of the turret. Any desirable " number of the tubes may be employed conveying in any direc- " tion forward and abaft as well as to the sides of the vessel. " These tubes are narrow at their outer ends and square and " larger at their inner ends. This form and the curve in the " tubes effectually prevent the water or shot from entering, while " they are well adapted to create a strong and constant draft of " air. Tubes are also employed for admitting air and light into " the hold and cabin of the vessel. The tubes for the hold incline " upward from the outside, and under ordinary circumstances " will in this way be protected from the entrance of water, and " the tubes for the cabin and state rooms may be advantageously " closed by metal caps for excluding both the water and shot. " Sliding stanchions are also employed for closing the tubes " when in action. The dome-topped pilot houses, of which two " are employed, are constructed to slide up and down in the " upper deck. These houses constitute the only means of ingress " to the interior of the vessel, and being raised when the vessel " is moving they afford additional means of ventilation and an " unobstructed look-out. Stationary screws, windlasses, or other " suitable means may be employed for raising the pilot houses. " When in action these houses are lowered so that the domed " roof only is presented to the enemy's shot. Circular fluked " anchors, which are attached to cables running out through " *hawse holes at the* bow, are employed. The anchor being hove

"up to the hawse hole in the usual manner, a stopper leading "up from the port-hole to the capstan is rove through the ring, "and the anchor drawn back. When the anchor approaches the "anchor port, a block and tackle suspended from a crane is "attached to a small ring in the crown of the anchor, by which "means the latter is raised to a horizontal position and the "anchor is then hove inboard by the stopper attached to the "capstan; when thus hove in, the circular flukes completely "close the port. These ports are on an inclined plane, being "reduced in size as they extend inward to about one-fourth of "their outer diameter. From the peculiar construction of the "anchor ports the anchors go overboard by their own weight "when released from the stopper. Should the vessel be in action "while at anchor, the ports may be closed by any suitable device. "The deck is raised around the turret, thereby affording it sup-"port, and declines in all directions towards the sides of the "vessel, and the turrets and other parts of the vessel above the "water line are so shaped as to present when in action a slanting "surface to the shot of the enemy. The smoke stack may be "lowered to a level with the deck, and the propeller is well pro-"tected by this form of construction."

[Printed, 4*d*. No Drawings.]

A.D. 1864, June 14.—N° 1468.

BROWN, JAMES, WAY, JOHN THOMAS, and EVANS, THOMAS MULLETT.—"Improvements in sheathing ships." "These im-"provements have reference to methods of attaching to ships "glass or vitreous-coated plates. In lieu of employing marine "glue to connect the backs of glass or vitreous-coated plates to "ships as has before been proposed, we employ the glue in con-"junction with a suitable fabric which is previously coated with "the glue on both sides; and the glue which we prefer to employ "is that described in the Specification of a Patent granted to us, "No: 2629, 1863. The fabric so coated may be first" attached "in pieces of any convenient size to the vessel; this is done "either by warming the glue till it becomes adhesive, or, in the "case of iron ships, by heating the surface of the ship itself; the "vitreous plates are then attached by warming the outer surface "of the glue, or by gently heating the plates themselves; or the "glue-coated fabric may be cut into pieces of the size of the "plates and made to adhere in the first instance to them; in

" this latter case we prefer to attach the pieces of fabric in such " a way that a portion of each piece overlaps one side and " end of the plate, which portion corresponds to an uncoated " portion of the succeeding plate; by this means the lines of " junction of the plates are dissimilar to those of the fabric and " less risk is incurred of water getting access to the sides of the " ship. Up to this time these vitreous-coated plates have been " generally stamped from the back part so as to cause a projection " in the centre; this has been done principally with the view of " preventing them from buckling, when heated, in fixing them to " the ship's side; but this form is objectionable as tending to " interfere with the ship's way in the water and to render the " plates liable to injury or to be torn off.

" One part of our improvements consists in employing strips of " glass-coated iron to fill up the spaces between these projections " after the plates are attached to the ship's side. For this pur- " pose we stamp the plates in such a way that the projection " occupies all but about a narrow margin at the outer edges of " the plate, the unraised part being by preference of the same " breadth around every edge of a plate. The plate is stamped to " such a depth as will allow for the thickness of the glass or " vitreous-coated metal slip with the coating of glue or glue- " covered fabric by which it is attached, so that when complete " the surface of the projections of the plates and that of the slips " of vitreous-coated metal shall coincide." "The strips of coated " metal thus used to cover the edges of the plates may be flat on " their under surfaces, so as, together with the cement or cemented " fabrics, to fill the hollow spaces between the contiguous plates; " or thinner metal, corresponding with that of which the plates " are formed, may be used, and their edges turned inwards, by " which the edges will be protected. Whatever be the form or " thickness of the metal used in making these strips, where it is " desired that they should overlap or pass across each other, " they may with advantage be made thin to admit of two thick- " nesses of the strips to be placed in the hollow between two " plates and yet only be flush with the raised parts of the plates. " In some cases, also, the strips may be formed with parts at right " angles to each other in the form of the letter T or +, so that " the parts intersecting may come in the recesses at the angles, " where two, four, or more plates come together."

[*Printed, 4d. No Drawings.*]

A.D. 1864, June 15.—N° 1486.

WHITESIDE, ROBERT.—" Improvements in preserving iron " ships and ships' sheathing from corrosion and fouling, and in " apparatus to be employed therefor." " It has before been pro- " posed to preserve copper sheathing from corrosion by attach- " ing to it pieces of zinc, and this arrangement is successful as " far as the preservation of the copper is concerned, but it " renders the sheathing very liable to foul."

According to this invention " I insulate the zinc from the " copper, and provide wires or conductors to connect the two; " these are led into the ship, or so arranged that they may be " separated and coupled up at will; when they are coupled the " sheathing is protected from corrosion, and should any foul- " ing be found to accumulate it is readily cleared off by uncoup- " ling the zinc from the sheathing. I enclose the zinc in a non- " conducting case, say, of gutta percha, which case is firmly fixed " to the copper, and air tight everywhere except at the lower " end. The sea water is suffered to enter the case and envelope " the zinc, and the wires are coupled when corrosion of the copper " sheathing is to be arrested; at other times the sea water may " be ejected from the case by forcing in air, suitable pipes and " air pumps being provided. In place of zinc another metal " positive to copper may be employed, and similarly sheathing of " compounds of copper or of metal other than copper may be " protected and preserved free from fouling by the employment " in the manner above-described of a metal negative to it.

" In order to protect iron ships I employ in a similar manner " two metals, the one negative and the other positive to iron, " and connect them alternately to the shell or skin of the vessel."

[Printed, 4*d*. No Drawings.]

A.D. 1864, June 16.—N° 1496.

HUGHES, THOMAS JAMES, and HOTTEN, WILLIAM HENRY. —(*Provisional protection only*.)—" An improved composition to be " used for coating surfaces and insulating metal from metal." The composition " will be principally used for coating the sides " of ships, and for insulating the sheathing thereof, it being " intended to place it between the metal side of the ship and the " metal sheathing thereof, whether copper, Muntz metal, or other, " or it may be used alone for covering or coating surfaces. It is

"composed of the residuum (after distillation) of either vegetable "mineral, animal, or fish oils, and we either use the residuum of "each oil separately, or we mix one residuum with another, or all the "residuums we can obtain together, and according to the nature "of the composition we desire to manufacture we mix the mass "with solvents, say coal tar, naptha, or petroleum, or with hard "bodies, say asphaltum, pitch, gums, or resins. If we require "our composition to be of a firm nature, we mix the residuum "of whatever oil or oils it may be the product in proportion of "three-quarters of a pound of asphaltum to one pound of "residuum, or of equal parts of pitch and residuum; if of a "sticky or adhesive nature, equal parts of residuum and resin; if "soft, two-thirds of a pound of coal tar to one pound of residuum, "but if it be required very soft and paint-like, we add to and mix "with the mass of residuum, naptha in proportion of one-third "of a pound of naptha to each pound of residuum."

[Printed, 4*d*. No Drawings.]

A.D. 1864, June 21.—N° 1551.

INGLEFIELD, EDWARD AUGUSTUS.—"Improvements in ma-"chinery for steering ships." The invention consists in employing machinery worked by hydraulic power to give motion to a ship's rudder, and the peculiarity is, that the machinery is so arranged, that it is actuated by water admitted to an engine from the exterior water in which the ship is floating. The arrangement of the machinery may be varied, but it is preferred that a fixed cylinder should be employed, situated at as low a position in the ship as may be, in order in each case to obtain as great hydraulic depth, and consequent pressure on the piston of the hydraulic engine as possible. The length of the stroke of the piston may be equal to that of the tiller, which is put in motion by the hydraulic engine; or a shorter stroke may be given to the piston of the hydraulic engine, so as to require two or more strokes of the piston to put over the tiller, the intermediate mechanism between the engine and the tiller being arranged accordingly. The size of the piston will depend on the area of the rudder, the greatest speed of the ship, and the depth at which the cylinder of the hydraulic engine is fixed below the level of the water external of the ship."

[Printed, 8*d*. Drawing.]

A.D. 1864, June 23.—N° 1579.

BAILLY, JEAN.—(*Letters Patent void for want of Final Specification.*)—"Improvements in the construction of ships and floating bodies, for the purpose of providing means of bathing "therein." This invention consists "in so constructing ships "and other floating bodies as to enable same to be used for bathing, either when a vessel is in motion at sea or stationary in dock, or used simply as a stationary bathing machine. The "following is an example of the means by which these improvements may be effected, that is to say:—At the centre part of "the bottom of the floating vessel or ship, and flush with the "keel or bottom, I construct an open space of any desired shape, "size, and depth, to be divided into compartments for different "classes and sexes of persons. The opening thus formed I propose to fit with caissons firmly built into the sides of the floating vessel. The bottom of the bath may be of copper, and is "intended to have openings formed therein for the admission of "water, so that in bathing at sea, whilst a ship is in motion, or "in docks situated in localities abounding with sharks, the "bathers will be perfectly protected from being assaulted thereby. "When bathing is not in season the bath may be easily rendered "water-tight and used for the stowage of merchandize."

[Printed, 4d. No Drawings.]

A.D. 1864, July 1.—N° 1641.

LANGTON, JOHN.—(*Provisional protection only.*)—"Improved "means of ventilating railway and other carriages, ships, and "other conveyances passing through the air." The means consist of "a perforated tube or channel or pipe with apertures "carried across or through the carriage or other compartment "to be ventilated. With this perforated tube or pipe I employ "two open-mouthed pipes connected to the perforated pipe by "tubing, and I carry the open-mouthed pipes outside of the "carriage or other compartment. The mouths are bent or "directed in opposite directions, so that when the carriage, for "instance, is travelling in one direction one mouth shall be "towards and the other from the wind. Inside the connecting "tubing I fit valves for regulating the flow of air through the "apparatus."

[Printed, 4d. No Drawings.]

A.D. 1864, July 2.—N° 1652.

DAVIS, WILLIAM BOLIVAR.—(*Provisional protection only.*)—
" An improved composition for preventing the fouling of ships
" and other vessels." This composition consists "of arsenic,
" carbonate of copper, linseed oil, spirits of turpentine, or benzine,
" or other equivalent substance, and the residuum of palm oil or
" tallow after distillation. These substances are mixed in about
" the following proportions:—

" Residuum of palm oil or tallow	-	25 parts
" Carbonate of copper - -	-	25 do.
" Arsenic - - -	-	20 do.
" Spirits of turpentine, benzine, or equiva-" lent substances - -	-	25 do.
" Linseed oil - - -	-	5 do.
" Total	-	100 do."

" Arsenic has been heretofore used in protective compositions for
" the purpose of destroying the animalculæ, but it has not been
" found possible heretofore to prevent the water from dissolving
" the arsenic and removing it from the composition. It has been
" found that the palm oil or tallow acts as a perfect shield for the
" arsenic, and effectually prevents the water from acting on it in
" any manner. The greater portion of the arsenic, however,
" combines with the carbonate of copper, and forms what is
" known as 'Scheele's green,' which is not only a very active
" poison, but is also almost insoluble in water."

[Printed, 4*d* No Drawings.]

A.D. 1864, July 4.—N° 1659.

WISKER, JOHN HENRY MARTIN VAN BUREN.—(*Provisional protection only.*)—" An improved armour or shield for protecting
" ships, floating batteries, and artillery from projectiles." The invention consists, first, " in protecting the hull of vessels, and the
" sides of floating batteries and forts by means of yielding cable,
" rods, or plates, the ends of which are secured to loops of india-
" rubber or other elastic material; and, second, in protecting the
" guns and gunners on the deck of ships, and artillery on land by
" means of a slanting shield or plate, the upper part of which is made
" to yield for the purpose of allowing projectiles to pass over the
" same without injury to the plate or danger to the gunners.

" For protecting ships, beams are secured at suitable intervals " from stem to stern, either vertically or horizontally as may be " found most convenient; these beams should be of sufficient " strength to resist shot and shell. Through these beams holes " are bored for the insertion of short lengths of india-rubber or " other elastic material. These elastic pieces are formed with " loops upon either end, to which the cable or other kind of " armour is attached by hooks or other suitable device. The " elastic pieces are placed at sufficient distance from the hull " to permit them to yield when the armour is struck by pro- " jectiles without bringing said armour in forcible contact with " the ship. The elastic pieces are protected by means of the pro- " jecting sides of the beams, the latter being constructed of or " plated with iron or steel. For additional security, two or more " rows of cables or rods may be employed, the inner ones being " so arranged as to fill up the spaces between the outer cables or " rods, thereby rendering the ship invulnerable; this armour " may be advantageously applied in a similar manner to floating " batteries and forts."

When the invention "is applied to the purpose of protecting " guns and gunners placed in exposed positions, the slanting " shield or plate used is confined at its lower end or side by means " of a hinge joint, and a spring is placed at the back of said plate " in such a manner that the upper and unconfined end of the " plate yields when struck by a projectile, thereby greatly diminish- " ing the effect of the blow, and allowing the projectile to pass " over the plate without injury to the gun carriages or danger to " the gunners. Sufficient space is left between the yielding " plates for the guns. The plates are hinged to the side of ships, " forts, and batteries, which are so constructed as to protect the " confined end of said plates."

[Printed, 4*d*. No Drawings.]

A.D. 1864, July 5.—N° 1665.

AITCHISON, ROBERT KER.—" Improvements in apparatus for " steering vessels." The first part of these improvements applies to vessels propelled by the screw, and consists principally in mounting the screw in the rudder of the vessel, in the manner herein-after described. An opening of appropriate size and form is made in the rudder, and the screw propeller (fitted on a short

shaft or spindle), is mounted in suitable bearings therein. This short shaft or spindle is connected to the propeller shaft by means of a universal coupling joint, so that whilst the ordinary propeller shaft constantly revolves on an axis coincident with or parallel to the central line of the vessel, it drives the short shaft with the screw on it at the same speed, at whatever angle the rudder may be moved. It will be evident that by this arrangement of the screw it will act as a very powerful auxiliary to the rudder, for as soon as the latter is turned either to port or starboard, the screw, instead of acting or thrusting still in the line of the vessel's course, acts or thrusts in the direction given to the rudder, and consequently causes the vessel to answer her helm much quicker than she otherwise would do.

Another advantage is, that by this arrangement the vessel can be turned round or otherwise manœuvred, without having previously any way on her.

If preferred, the screw in the rudder may be used in addition, or as an auxiliary, to the ordinary screw in the dead wood of the stern, in which case a much smaller screw will be required in the rudder.

" I propose also to use a screw having two vanes only, which " are capable of being set to the required angle, or of being " brought into the same plane, so as to fill up, or nearly so, the " opening in the rudder, in order that the latter can be used in the " ordinary manner when the vessel is propelled by the wind alone."

" To the tiller of the vessel which moves the rudder a toothed " segment is attached, which is acted upon by a toothed pinion " keyed upon the spindle which carries the steering wheel. Upon " this spindle is also keyed a notched wheel or disc in connection " with which is a sliding stop, which is thrust into any one of the " notches in the wheel or disc, so as to lock the spindle (and " consequently the rudder) whenever the steersman places his " foot on a treadle, which is conveniently placed for that pur- " pose, and on his removing his foot from the treadle the stop " is withdrawn from the notch, and the spindle and rudder are " perfectly free."

[Printed, 10*d*. Drawing.]

A.D. 1864, July 7.—N° 1684.

SKINNER, Henry Edward.—"An improved steering apparatus." The invention has reference to " an improved construc-

"tion of steering apparatus in which the mechanical arrangement "and disposition of the working parts thereof is greatly simplified, enabling the rudder to be brought round with less manual "labour and number of revolutions of the steering wheel than by "the system at present in use, and consists in mounting the "steering wheel upon a horizontal axis within fixed bearings "upon an upright pillar, standard, or column secured to the deck "of the vessel, by the arrangement of which the said wheel is "caused to communicate motion to the rudder through the "medium of a convoluted cylinder or slotted shaft fitted in con- "nection with the rudder head, a traversing nut or socket fur- "nished with projecting studs or threads taking into the said "convolutions in connection with a double chain and pinion "motion in gear with the axis on the rudder wheel being em- "ployed for raising and lowering the nut, and thereby giving "motion to the cylinder aforesaid in conjunction with the rudder, "the said nut being maintained in its vertical position by guide "slots formed within the pillar standard."

[Printed, 8*d.* Drawing.]

A.D. 1864, July 15.—N° 1778.

CHALMERS, James.—"Improvements in armour for ships of "war, floating batteries, and fortifications." The chief feature of this invention consists in combining iron and timber together in alternate layers of, say, four plates of ½-inch iron and three planks of timber of six inches, more or less, in thickness, both plates and planks being, say, 12 inches, more or less, in width; these layers, when properly put together, will form a compound block, beam, or plank, which can be used for frames, deck beams, &c., for ships of war and floating batteries; for the construction of land fortifications; for roofing casemates, &c., and as a backing to armour plates generally. See also Letters Patent for the same invention, N° 3105, 1862, for "improvements in the use, com- "bination, and application of iron and timber as armour for "vessels of war and fortifications."

[Printed, 10*d.* Drawing.]

A.D. 1864, July 19.—N° 1804.

DE BRIOU, Henry Edward Francis.—"An improved com- "position for protecting and preserving metals, such as iron, "copper, and zinc, used in the construction of ships, or in the

" protection of their sides and bottoms from oxydation and corro-
" sion from the action of sea water; and for protecting from
" corrosion all submerged substances, such as chains, anchors,
" cables, and every oxydable metal submerged in water, or
" exposed to atmospheric influences." The invention consists
" in coating the metals, iron, copper, zinc, the ships' sides and
" bottoms, and all surfaces or objects to be protected with an
" improved composition formed of

" Vulcanized india-rubber	-	750 parts.
" Mineral pitch	- -	250 „

" The india-rubber cut into small pieces is thrown into a copper
" cauldron, placed upon a slow fire and heated until it is melted;
" all the time it must be stirred up, then the mineral pitch is
" added and melted; the mixture must be stirred up for some
" time until the two substances are thoroughly mixed together,
" and left boiling for two or three hours; then the fire is put out.
" Before it cools down, the composition is poured into barrels,
" copper, iron, or other vessels, and kept ready for use.

" To apply it, the requisite quantity put into a copper vessel is
" placed upon a slow fire, melted again and spread over the sur-
" faces to be protected by means of a vegetable brush; and then
" to spread it smoothly and uniformly upon the surfaces, a lighted
" torch of reeds, such as used in melting tar, is held close to it,
" which makes it run and gives it a smooth surface."

[Printed, 4d. No Drawings.]

A.D. 1864, July 23.—N° 1836.

OSLER, Abraham Follett.—(*Provisional protection only.*)—
" Improvements in constructing and propelling ships and other
" floating vessels." Near each end of the ship a horizontal shaft is situated, each shaft working in bearings on either side of the ship; the said shafts are situated in a plane about midway between the upper and lower surfaces of the ship. Each of the shafts carries at each end a wheel, which wheels are not circular, but of an octagonal or of other angular figure. The diameter of the wheels is somewhat greater than the depth of the ship. Upon the wheels two jointed endless chains work, the chains passing over and under the ship; these chains are made of metallic bars of a length equal to the distance between two contiguous angles of the wheels. To the outer sides of the endless chains, transverse *tubular closed vessels* or floats are fixed, and on the inner side of

the chains, rollers or antifriction wheels work. The floats described are of such size that that portion of the series always under the ship is buoyant under the heaviest load of the ship, hence the ship itself does not rest upon the water, but is supported above it by the floats. When the ship is placed upon the water, and a propelling force is applied to it, it is made to advance upon the rollers or antifriction wheels on the endless chains, the floats immediately under the ship remaining stationary, or nearly stationary. " By the advance " of the ship the wheels on which the endless chains work " advance and rotate, the state of rest of the lower part of end- " less chains causing the upper part to travel over the upper part " of the ship in the direction of the ship's motion, and with " double the ship's velocity. By the motion described, the end- " less chains lay down floats in advance of the ship, and take up " those at its rear, the ship at the same time travelling upon the " rollers or antifriction wheels between it and the endless chains. " By the construction described, there is formed, as it were, a " floating platform carrying rollers on which the ship travels, " the said floating platform being simultaneously laid down in " advance of the ship and taken up at its rear. The ship travels " on the rollers of the said floating platform without encounter- " ing the resistance which would be produced by its motion " through water.

" Ships constructed according to my invention may be pro- " pelled by the action of the wind upon sails. When the ship is " propelled by steam or other motive power contained within the " ship, the said motive power is applied to produce the rotation " of the shafts described; by the rotation of the said shafts the " ship is made to advance."

[Printed, 4*d*. No Drawings.]

A.D. 1864, July 26.—N° 1866.

SCOTT, Michael.—" Improvements in constructing ships or " vessels." It has been proposed to construct ships or vessels with a complete skin of iron, and to apply wooden planking both externally and internally, this planking being secured by bolts through the whole. This method of construction has not come into use, and is objectionable principally because the vicinity of the copper sheathing to the iron bolts will cause the rapid destruction of the bolts.

One part of this invention consists in substituting trenails for the bolts above mentioned. " I employ an iron structure, and " combine therewith external and internal planking, which I " secure by means of wooden trenails driven through both the " plankings and through the iron structure, the iron structure " having holes or openings in it to allow the trenails to pass " through; the two plankings are thus drawn together, and nip " the iron structure firmly between them; the planking is caulked " both externally and internally. As respects the lower portion " of the vessel, from the keel for some distance up on each side, " and also as respects the parts of the vessel at the bow and " stern, the iron structure I prefer to employ is an ordinary skin " supported on ribs or frames. The butt joint covering plates of " the skin I place on the outside, and then I make a flush surface " for the planking by " filling " in between the butt joint " covering plates with thin boards; these thin boards are also " useful in preventing the trenails and outer planking working on " the iron structure."

The central portion of the vessel, from where the skin above-mentioned terminates up to some distance above the water-line, it is preferred to make according to another part of the invention. Here the iron structure is made up of a latticework of iron bars crossing each other diagonally; the bars are rivetted at their lower ends to the upper edge of the skin before mentioned, and they are also rivetted one to the other and to the ribs or frames, where they cross. The ribs or frames, which are made stiffer, and are placed further apart than is now usual, are firmly tied together by the diagonal bars. The spaces between the bars are filled with thin planks of wood, applied in two layers, each of the same thickness as the iron bars. The planking within the ship is applied vertically between the ribs or frames, and it may be in comparatively short lengths, and the joints are caulked, so that the timber becomes firmly jammed in between the ribs or frames. It is preferred to apply the internal planking between the ribs in two layers, breaking joint. The external plank is applied as before, and the whole is trenailed through, the trenails passing through the openings in the frame of diagonal bars.

" The caulking or jamming the inside planking between the " ribs or frames is an important feature of my invention, as it " gives great stiffness to the vessel, and is more especially use- " ful *when the structure* connecting the ribs or frames is not a

"complete skin" but "a latticework of bars, as above described. "The internal planking may, if desired, be iron fastened to the iron "structure or diagonal frame, and the external planking where "it comes over the diagonal frame may be copper fastened in "place of or in addition to being trenailed to the internal planking, "the bolts passing through the intervals of the diagonal frame." "Copper, or mixed metal sheathing may be applied in the usual "manner over the timber planking. The upper works of the "ship from a short distance over the water line I prefer to con- "struct as an ordinary iron ship."

[Printed, 1s. 10d. Drawings.]

A.D. 1864, August 4.—N° 1941.

CRUICKSHANK, FRANCIS.—"Improvements in coatings for "the prevention of the fouling of the bottoms of iron and other "ships." This invention relates to "the prevention of the foul- "ing of the bottoms of iron and other ships by means of one or "more of the following mercurial compounds made up or incor- "porated with a suitable medium to form a coating or paint to "be applied to the surface to be protected. The mercurial com- "pounds referred to are, 1, red oxide of mercury; 2, white pre- "cipitate of mercury, the substance specified in the British "Pharmacopœia as 'Hydrargyrum ammoniatum;' and, 3, oxy- "chloride of mercury, or any of the various definite chemical "compounds of corrosive sublimate and protoxide of mercury "included under that designation.

"The medium with which the mercurial compound is incor- "porated may be varied, provided that it is of a resinous or" "oleaginous, but not of a saponaceous character." "What I at "present believe to be the best way of preparing and applying "my improved anti-fouling coating" is as follows:—

"I take one gallon of a solution of rosin in turpentine (made "by dissolving with the aid of heat ten pounds by weight of "rosin in one and a half gallons of turpentine) and mix it with "half a gallon of a solution of gutta percha (made by dissolving, "with the aid of heat, four pounds of gutta percha in one gallon "of turpentine). To each gallon of the compound obtained by "mixing these two fluids I add five and three-quarter pounds of "any one or more of the mercurial compounds, herein-before men- "tioned, and having thoroughly incorporated it with the fluid, I

" add an equal weight, namely, five and three-quarter pounds of
" a suitable substance, such, for example, as red oxide of lead,
" for the purpose of giving it due consistency; the whole is then
" thoroughly mixed. Thus prepared, the mixture may be applied
" directly as a coating to the vessel, or if necessary it may be
" rendered more fluid by the addition of a small quantity of
" turpentine."

[Printed, 4*d*. No Drawings.]

A.D. 1864, August 6.—N° 1961.

COLES, Cowper Phipps. — (*Provisional protection only.*) — " Improvements in the construction of ships of war." " The " object of my invention is to build unsinkable ships of war with " the midship section above the water line intended for the " battery, plated with armour plating so thick as to resist the " shots from any gun however great its power, say, armour " plating eleven inches thick. Just below the water line I form " what I term a raft-deck, and cover or form this of iron plating. " Below this raft-deck I form another deck, and erect upright " partitions between these two decks. I insert casks or other " similar vessels for containing air between these decks, and I fill " the compartments with water and provide each compartment " with one or more small holes communicating with the water " outside the ship. Above the raft-deck I construct another " light deck and separate the space between these two decks " into compartments. For ordinary purposes I intend that these " compartments should not be occupied, though for such pur- " poses as conveying troops they may be converted to their use. " Again, should it be necessary to increase the immersion of the " ship, water may be admitted into some or all of them. Above " the last-named light deck, both fore and aft of the armour, I " construct a living deck for officers and crew, and cover all with " a weather deck."

[Printed, 4*d*. No Drawings.]

A.D. 1864, August 6.—N° 1962.

BARTLEY, Charles.— " Improvements in compositions for " preventing the bottoms of iron ships from fouling or corro- " ding." For this purpose " I apply to the bottom of the iron " *ship, in the first* place, a coating of the finest white lead paint;

"over this I lay, when dry, a second coating prepared by com-"
"pounding one hundredweight of the white lead paint with six"
"pounds of corrosive sublimate dissolved in methylated spirits of"
"wine, using only as much spirit as will take up the corrosive"
"sublimate, six pounds of powdered gum arabic, six pounds of"
"castor oil, which give consistency to the compound, and one quart"
"of naphtha; this coating being well dried, a further coating as"
"a finishing, or third coating, is employed, consisting of a paint"
"prepared as for the second coating, but with a larger proportion"
"of dissolved quicksilver, say eight pounds of corrosive sublimate"
"in place of six, and I also add three pounds of verdigris and"
"one gallon of fish oil (turtle is best), but common whale oil"
"may be employed. These materials are well and intimately"
"mixed together, and applied as when painting with ordinary"
"paints."

[Printed, 4d. No Drawings.]

A.D. 1864, August 6.—N° 1963. (* *)

McHAFFIE, Neil.—"Improvements in treating iron plates for "ship building, boiler making, and similar uses, and also wrought "iron in other forms, to render it capable of resisting oxidation "or destruction by sea and other water and atmospheric and "other corroding influences."

Wrought-iron plates or other articles are placed in suitable closed vessels or ovens surrounded with oxides of iron or other metal, by preference hœmatite ores. The plates and other articles are kept at a red heat for from 12 hours to three days, the latter being sufficient for thick armour plates. They are then allowed to cool gradually, or quickly if they are required to be hard. The surface of the plates or other articles so treated will be made capable of resisting the action of sea water.

[Printed, 4d. No Drawings.]

A.D. 1864, August 6.—N° 1965.

COUSINS, Sidney Leslie.—(*Provisional protection only.*)— "Improvements in the construction and propulsion of boats "applicable to their conveyance either on shore or afloat." The invention consists of "a boat constructed of waterproof canvas, "wood, iron, or other suitable materials, to be conveyed over "land on wheels, with or without springs or other easing gear "*no carriage being required.*

"The boat is constructed with one or more frames, which "support the weight of the boat and its contents on an axle or "axles and wheels. I prefer to use two longitudinal frames, "thus obtaining the requisite strength of structure without the "additional weight of a carriage. It can be propelled both on "land and afloat by means of a cranked axle, turning wheels "with paddles attached, the cranked axle being turned by hand "or foot power, or both combined. The boat, however, may be "drawn overland by animal or other motive power in the usual "manner, and may be propelled through the water with oars, "sails, or the usual appliances, should these means of propulsion "on any occasion for any reasons be found desirable. It may "be steered on land by a wheel, which acts as a rudder when "in the water."

[Printed, 4*d*. No Drawings.]

A.D. 1864, August 20.—N° 2067.

WALKER, JOHN.—"Improvements in ships of war and bat-"teries, and in mounting, working, and covering guns to be used "therein."

The invention consists, first, in applying or making, fixing, and employing the hydraulic machinery, as and in the manner described, on board ships of war, floating, marine, and other batteries and forts, for raising, lowering, and working guns therein, more especially those of great power and weight, so that by this improved mode of mounting the guns, however heavy they may be, the raising, lowering, and working the same can be effected with very little power, and be easily and readily performed by hand or otherwise.

2. In so forming and placing the working machinery, platforms, and connections, that the guns mounted thereon can be turned and fired therefrom on either side of the ship below the deck, and be turned and fired in any direction when raised above the deck.

3. In so mounting the guns and connections that they may be lowered and loaded and fired below the water line, and be raised and fired at or above the surface of the water.

4. In so covering the said guns, firing platform, and connections, that the same shall be protected from the enemy's fire, except at the moment the guns are being discharged.

5. Of a ventilating shot and shell proof deck, and deck covering, for the more effective protection of the men while working the guns.

6. In belting the sides of ships, whether already constructed, or to be constructed (of iron or wood), with the armour belts herein described, and thereby converting an ordinary ship of iron or wood into a formidable marine battery or vessel of war, at a trifling cost as compared with the outlay required for building an entirely new ship.

7. In elongating guns, for increasing their power, by means of fixed, sliding, and adjusting truncated cylinders.

The essential feature of the first improvement is "the mounting
" of the guns upon platforms supported separately upon and to
" turn round upon a vertical axis or shaft in hollow rams or
" pistons, moving up and down in cylinders filled with water or
" other fluids, as aforesaid, communicating with each other by a
" pipe or pipes in whatever position these cylinders may be placed,
" so that as one gun is raised to be fired the other descends to be
" reloaded by the men, who are protected below the water line and
" by the sides of the ship from danger, the guns being also
" thereby covered from the enemy's fire. Guns worked on this
" plan need not be breech-loading, as by placing them in the
" centre of the deck there is sufficient room on each side of the
" vessel for the men to sponge and load without turning the guns
" round, being placed along the centre line of the ship; when
" lowered they carry down the centre of gravity, and they lessen
" the rolling of the ship, and tend to increase her speed when
" under steam or sail."

The armour belt referred to "is formed by first placing vertical
" ribs of ⊥-iron next to the side of the ship or battery, and then
" filling in the space between the long limbs of the ⊥'s with
" timber placed vertically or edgeways. This compound of iron
" ribs and timber I denominate the inner backing. Over this
" I place a strong plating of iron or steel horizontally, which I
" denominate the intermediate armour plate; upon this I
" again fix ⊥-iron ribs, also horizontally, and between the
" long ribs of the ⊥'s again fill in the spaces with timber
" (still placed horizontally). This layer of metal and wood I de-
" nominate the outer backing, over which I lay and fix the
" covering slabs of iron and steel for the outer or main armour
" plates. These plates are formed with rebated edges, and are

" joined or bound together and held in position by vertical T steel " double-rebated flanges carrying strong bolts, which pass through " the whole of the belt, and through the skin of the ship or side " of the battery. This belt is formed with suitable port-holes for " the tube, and in the case of ships has an inclined surface at the " top, so as to prevent the enemy from boarding. The belt dips " under the water line several feet, and is partly supported by the " water it displaces, and at the same time helps to steady the ship " when in action or at sea.

" The upper deck and upper firing platform and roof are covered " with a shot and shell proof plating, and the ribs of the ship " and belt are made hollow to allow for ventilation. The upper " deck port-holes are fitted with sliding covers to close the same, " except at the time of firing; and these covers are moved from " below the deck by ropes and pullies, or any other suitable " means, a tongue passing through a slot under the slide for that " purpose."

[Printed, 2s. Drawings.]

A.D. 1864, August 25.—N° 2096.

HUGHES, Thomas James.— (*Provisional protection only.*)— " Improvements in coating and sheathing the bottoms of ships " or other vessels." " I propose " " to apply a thin coating of " leaf metal (copper or other) almost in contact with the iron or " wood of which the ship's bottom is composed, such metal to be " rolled, beaten, or otherwise made so thin as to require no " fastening other than marine glue or similar adhesive substance, " and afterwards to coat or cover the said thin metallic sheathing " with paint, with preparations of gutta percha, caoutchouc, or " with any of the known preparations used for this purpose, and " finally, where the expense is not a prohibition, with an outer " casing or sheathing of copper or other metal.

" And in order the better to avoid the results of abrasion or " the constant lapping of water against the sheathing of ships " or other vessels I propose, in addition to the mode of over- " lapping and underlapping the ends of the copper " or other metal " secured to me " by Letters Patent (No. 451 of 1864), to solder the said ends or laps together after the underlap is fastened to the ship's bottom; and to effect this, " I prepare the ends (or " laps) and the edge or edges thereof in any way I may think fit

"for soldering, my object being that when the over and under "laps are soldered together, the edge of the overlap and the "shoulder of the underlap may be well armed or coated with the "soldering preparation (say, tin, pewter, or other soft metal or "amalgam), thus presenting no edge of the copper (or other metal "used for sheathing) to the immediate action of the water, and "effectually covering up the fastenings by which the sheathing "is held to the ship."

[Printed, 4d. No Drawings.]

A.D. 1864, August 29.—N° 2118.

CAMPBELL, JAMES. — "Improvements in floating docks." This invention has for its object "economy in the chief design "and construction, combined with efficiency in the working of "docks adapted for the largest class of ships or vessels, and it is "also intended to provide the means of floating off the next and "smaller class of ships or vessels upon trays or pontoons into "shallow docks or elsewhere when considerable repairs are "required to be done.

"The dock for the larger class of ships or vessels is preferred "to consist of twenty compartments (ten on each side of the "keel), each composed of a lower or floating chamber, a balance "chamber, and an upper tank, and it is made with its inner skin "to a shape fitting within a few feet to the midship section of "the largest sized ship at the bottom, with sides either vertical "or battering out, say, about one in six. The external skin is "about parallel to the internal at a distance of about one-fifth of "the internal width of the dock. The dock is sunk ready for "lifting by the weight of the water introduced into the upper "tanks, and when the large ship or vessel has been admitted into "the dock and the water let off from the upper tanks, the whole "rises out of the water to the extent of, say, about ten feet. "Caissons of the kind herein-after described are then put at each "end of the dock, and sunk or otherwise fixed in their places, "and the water within the dock is allowed to sink into the lower "or floating chambers by means of valves, when the ship or "vessel which has been shored up from the sides of the dock "can be examined, cleaned, or repaired, as required. When this "is done the external water can be admitted inside the dock "until the water is level inside and out, when the caissons may be "removed and the vessel floated out. Before taking on another

" ship or vessel the water has to be pumped out of the floating " chambers into the upper tanks and the surplus water got rid of. " By means of the above described arrangement the necessity for " working any machinery, engines, boilers, or pumps during the " whole process or processes of raising and lowering the vessel is " obviated.

"The form of the caissons above referred to is as follows:— " The floating power is confined to the top, and the remainder is " composed of water-tight thicknesses of plates with stiffening " ribs. For the smaller class of ships or vessels there is inserted " in the dock a tray or pontoon, upon which the vessel rests. " By letting the water out of the upper tanks until the bottom of " the tray or pontoon rises above the external water, so as to be " thoroughly emptied, and then lowering the dock by admitting " the water into the lower chambers of the dock, the tray or pon- " toon with the vessel on it is floated off into shallow basins or " elsewhere, as required. The form of the tray or pontoon above " referred to is made to correspond as nearly as convenient to " the shape of the lower part of the inside of the dock. This " form of tray or pontoon may be used either in combination " with the dock constructed as above described, or it may be " otherwise used. For repairing the dock I employ an iron belt " or trough which has three sides, but is open at the top, and " floated at each end by ordinary tanks, to which it is fixed. The " top of the said belt or trough corresponds in form, or nearly " so, with that of the dock, and can be moved along it to the " part requiring repairs, when by sinking the dock a little, or " preferably by pumping water out of the end tanks, it can be " made to spring tight to the dock, and to make a water-tight " joint if properly packed. The water may then be pumped " out of the belt or trough, when the repairs can be proceeded " with. A cutwater may be adapted and applied to each end of " the dock, so as to allow of its being propelled by means of a " propeller, and the rudder may be placed pro tempore with its " axis in the centre of the dock, being secured at the top on a " transverse beam."

[Printed, 2s. 4d. Drawings.]

A.D. 1864, August 30.—N° 2131.

HENSON, Henry Henson.—(*Provisional protection only.*)—

" *Improvements in sheathing or protecting ships, vessels, and*

" other structures." The invention has for its object " a cheaper " and improved application of certain pieces of glass as a means " of protection to the surface of ships, of whatever materials such " ships may be built, and consists in the application of cast, " blown, flatted, or otherwise manufactured glass or materials " containing the constituents, ingredients, or combination of ma- " terials necessary for the production of any commercial product if " called glass; the glass may be applied to the ship in small or large " pieces, and generally quite flat and without holes in the same, " and may be of a smooth surface on one or both sides. In most " cases I prefer the use and application of pieces of glass of small " dimensions for the sake of security and cheapness, for the " lesser damage which may happen to the pieces, and for facility " of repair if damaged."

The glass is to be attached by marine, or Hay's, glue, or other like compound, either directly or with the intervention of some fibrous, felted, or woven fabric, or open canvass, such as scrim.

" Another process consists in the use and application of large " or small pieces of colored earthenware having one outer smooth " and one inner or under rough surface, the pieces may be of any " convenient thickness or shape suitable for the covering or " sheathing of a ship's surface, the several parts of which may be " secured to the ship by some of the before-mentioned modes, or " by any suitable mechanical means; in some cases I unite in " the same material the properties of a siliceous compound or " glass with the advantages of earthenware by making thin slabs " or pieces of rough earthenware, and before the process of hard- " ening by means of heat takes place, instead of the common " mode of enamelling or glazing the surface of earthenware " generally, I prepare and amalgamate the ingredients or com- " binations of siliceous materials necessary for the production of " bottle and other kinds of glass; these are laid upon one only of " the rough surfaces of the earthenware, and then subjected to " such a degree of heat as will fuse the same and cause a vitrified " surface to be produced."

[Printed, 4*d*. No Drawings.]

A.D. 1864, September 5.—N° 2167.

LANGHAM, WILLIAM.—" An improvement in the constructing " *vessels of* war and fortifications." The invention consists " in

" constructing the sides of a vessel of war or the side or front " of a fortification of a series of acute angles on both sides of " the vessel, or the side or front of the fortification, of iron " or steel of suitable thickness, the angles terminating in apertures " or passages through the vessel or other fortification, which I " denominate shot passages, such passages to be lined with iron " or steel of suitable thickness, so that the shot on striking the " inclined sides will pass through the passages into the water on " the opposite side of the vessel or through the fortification." The angles of the inclined sides, are about forty-five degrees. The passages at the inner parts of the angles are eight feet high and four feet wide. " Between each of the passages there is a " gun room eight feet wide less the thickness of the sides and " eight feet high," " in which a gun may be placed to be pro- " jected (for the purpose of being discharged) at the point of each " angle. The opening for the gun may be closed whilst being " loaded by an iron or steel plate or doors of sufficient thickness, " and the gun when loaded may be forced forward. But in " constructing a vessel or fortification upon this principle, the " height and width of the gun rooms and the height and width " of the passages may be increased or diminished according to " circumstances."

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1864, September 5.—N° 2168.

SYMONDS, Thomas Edward.—" Improvements in the con- " struction of ships and other vessels." " In constructing ships " and vessels or war where more or less of the central position of " the body of a ship or vessel is formed with a battery carrying more " or less guns on either side, it has in some vessels been the " practice to form the forward and after ends of the battery by " transverse bulkheads, in each of which near the sides of the ship " or vessel, but somewhat inboard, two ports or openings have " been formed, in order that two guns may be fired through such " ports or openings, and in such cases parts of the bulwarks have " been hinged in such manner as to be moved inwards at the " ends next the bulkheads."

Part of this invention consists in causing the forward and after transverse bulkheads at the ends of a ship's battery to be formed with curved or rounded parts, where the bulkheads are connected

to the sides of the ship or vessel, and in forming a port-hole or opening through each of such curved or rounded portions, by which, and by rounding the sides of the ship or vessel beyond where the transverse bulkheads are connected to the sides of the ship or vessel, the guns may be fired through such port-holes or openings, in lines parallel with the keel, and also through the same port-holes at a considerable angle, approaching a right angle to the keel, whilst at the same time the guns may be depressed to a greater extent than guns similarly placed when firing through transverse bulkheads, and over the deck, as heretofore constructed.

" In all single-deck ships this method of constructing the " ports and bulkheads admits of two methods of fitting the " bulwarks so as to enable the guns to be fired in the manner " described, viz., either fixed or moveable; when moveable, they " are constructed in two parts, one hinged from forward and the " other from aft, or vice versâ; where fixed, the bulwark is " brought to the inner side of the port, thus leaving sufficient " space for the gun to be fired from the curved bulkhead at any " angle of depression or elevation; this arrangement admits of " the forecastle deck being brought aft to the armour-plated " bulkhead, thus affording increased accommodation without " interfering with the working of the gun.

" The after ports in both these methods may be constructed in " a similar manner, and the side of the vessel may be rounded " inwards abaft the bulkhead, the vertical bulwarks being placed " at a sufficient distance inboard clear of the port, so as to allow " the after guns to be fired at or nearly with the line of the keel.

" Furthermore, to attain the same object in frigate-built ships, " more especially on the main or gun deck, the ribs or upright " frames of a ship commencing next the junction of the armour " plate of the side, and an armour-plated bulkhead, as they rise " to about the level of the cills of the port-holes or openings are " bent inwards, and they are curved upwards and continued in " such manner as may suit the required form of the ship. The " object of this construction is to produce, as before mentioned, " embrasures in the bow and also in the sides of the after part " or quarter of the ship or vessel parallel with the keel, so as to " allow of the fire of the guns before mentioned being in lines " parallel with the keel or nearly so.

" In constructing the lower part of the body of a ship or vessel " where longitudinal framing is introduced to form webs between

"the ribs or vertical frames, in place of the webs formed between "the top and bottom flanges of the vertical frames being of per- "forated or unperforated sheet iron, the webs are, according to "the present invention, constructed of trelliswork, by which a "greater relative strength of longitudinal frames of ships is "produced as well as a lighter and more economical method of "construction. This method is also applied with a similar view "to the principal beams of a ship in lieu of the present wrought- "iron beams.

"In constructing rudders of ships or vessels upright hollow or "solid bars of iron or other material are used, framed together at "the top and bottom in such manner that the upright bars are "parallel to each other, but at a suitable distance one from the "other. These upright bars may be formed either of two "or more sides of lozenge, diamond, or other section; when "of diamond shape, the angle formed by the two forward sides "of each bar comes opposite to the angle formed by the two "after sides of the bar next before it; hence, when a rudder so "constructed is put over, the forward inclined surfaces of the bars "will be more readily brought in a line at right angles with the "keel than the central plane of the rudder, whilst the water "acting on the inclined surfaces of the bars will be led through "or escape between the openings, and thus prevent any void or "vacuity taking place on the side of the rudder opposite to that "which for the time is put over.

"By this construction of rudder less mechanical effort will be "required to get it over to any desired angle, the strain on the "stern post and pintles and the rudder head, will be considerably "diminished.

"Furthermore, in some cases it is preferred to form longitudinal "slots or openings at angles corresponding with the angles of the "bars previously described."

[Printed, 1s. 8d. Drawings.]

A.D. 1864, September 6.—N° 2179.

SMITH, John.—"Improvements in saving ships or other vessels "from sinking." "These improvements have for object the saving "of ships or other vessels from sinking when their bottoms have "become leaky or damaged by a heavy sea or other cause, and the "invention has reference more particularly to ships or other "vessels having two decks; the lower deck about the water line

" having divisions according to the size of the ship or vessel. " There is one or more hatchways to each division, which hatch- " way or hatchways is or are constructed differently to those " heretofore used. The outer framing of the hatchway is made " broader than hitherto and also lower, and is rendered air-tight " and water-tight. Between the framing of the hatchway and the " hatchway itself or the lid, I place a layer of vulcanized india- " rubber or equivalent material, and press the lid on the framing " by screws or similar contrivances. This lid is screwed down or " otherwise secured, and rendered air-tight and water-tight. I " employ one, two, or more pumps for forcing air, the number of " pumps varying according to the size of the ship or other vessel, " with requisite piping to conduct air to different parts of the " ship or vessel. I also employ indicators and safety valves of " ordinary arrangement. I make the windows or other outlets of " the ship or vessel air-tight and water-tight, and underlay the " framing thereof with vulcanized india-rubber or equivalent " material, so as to render the same air-tight and water-tight."

[Printed, 2s. 4d. Drawings.]

A.D. 1864, September 9.—N° 2206.

COPPIN, William.—(*Provisional protection only.*)—" Improve- " ments in the construction of ships and vessels." The bottom of the ship or vessel is divided into two or more sections or parts by one or more longitudinal channels or water spaces, which are open at the bottom and run from end to end of the vessel; at the two ends of the vessel the water spaces are also open at the top. " At the midship part of the vessel the channels or water spaces for " about one-half the length of the vessel are decked over, and the " two or more parts into which the vessel is divided by the channel " or channels are thus connected together, the under side of the " deck or cover of the water channel or channels being made to " come considerably above the load water line of the vessel. " Each of the two parts into which the vessel is divided by the " channel or channels is made with similar curved lines on each " of its sides, its inner side which forms the side of the water " space being of a similar form to its outer side, and the lines of " the sides may be made much finer than it is practicable to make " the lines of vessels constructed in the ordinary manner. Each " of the parts into which the vessel is divided is made of its " greatest depth in the centre or amidships, and to taper to a

" point or nearly so at each end; each part of the vessel will thus " resemble in form an arched beam or girder. The lower portion " of the bottom of each of the parts into which the vessel is " divided is, by preference, made semicircular in cross section, " and, as before stated, the lowest point of the bottom of these " parts is amidships with the bottom, sloping upwards towards " the two ends, and the curve of the slope is, by preference, made " the same as the curve to which the sides of the parts are formed. " The line of the top of the midship portion of the vessel where " the channel or channels are decked or covered over is made to " form a continuation of the curve to which the upper edge of " the ends of the parts which are separated by the channel or " channels is formed, and the form of this curve will depend upon " the height of the vessel; by forming the parts of the vessel in " this manner great strength will be obtained, at the same time " the side surfaces of the ends of the vessel that are exposed to " the action of the waves of the sea will be much reduced. Each " of the parts or sections into which a vessel is divided may " be divided up by any suitable number of decks. The central " portion of the vessel that is above and which connects together " the parts that are separated by the channel or channels may " also be divided up horizontally by one or more decks. This " central portion of the vessel is also divided up by strong trans- " verse bulkheads, so as to compensate for the loss of strength " consequent on the formation of the longitudinal water channel " or channels. The two ends of the parts or sections into which " a vessel is divided are covered over at the top so that no water " may enter into these parts. These parts may thus at times be " covered with water.

" Vessels constructed as above described may be propelled by " sails or by paddle-wheels, screws, or other propellers, and when " paddle-wheels are used they may not only be placed on the " exterior sides of the vessel, but also in the longitudinal channe " or channels which run from end to end of the lower part of the " vessel."

[Printed, 4d. No Drawings.]

A.D. 1864, September 13.—N° 2236.

RITCHIE, Joseph Horatio, junior.—" Improvements in bolts " used in the construction of ships and vessels." This invention

has for its object "the insulation of bolts used in the construction "of ships or vessels, more especially those built with iron frames "planked with wood, so that if iron bolts are employed they shall "not be wasted by the galvanic action caused by their contiguity "to the copper or yellow metal sheathing; or, on the other hand, "if yellow or composition metal bolts are used, they shall not "have any injurious effect on the frames through which they "pass. In order to accomplish this object, I cover the bolts "entirely or on those parts contiguous to the dissimilar metals "with caoutchouc, or caoutchouc and gutta percha, or other mix-"ture in which these form essential ingredients hardened by the "process known as vulcanization." The iron head of the bolt is generally entirely covered with the insulator, but in cases "where "great percussion has to be borne by the head, it may be found "desirable to allow a portion of the centre of the iron head to "project a little above or be flush with the surface of the vulca-"nite so as to receive the heavy blows; the portion of iron thus "left uninsulated may, after the bolt is driven, be easily covered "with any insulating material."

"The composition of the vulcanite or ebonite I prefer to be "such that it shall at the same time be tough as well as hard. I "have found that a compound of caoutchouc masticated with "from $\frac{4}{10}$ths to $\frac{5}{10}$ths its weight of sulphur laid on the bolt in a "plastic state, and tightly bound thereto with tape or other "material, and exposed to a heat of 300° Fahrenheit for from "three hours to four hours answers the purpose well."

[Printed, 6d. Drawing.]

A.D. 1864, September 17.—N° 2281.

HARRISON, John.—(*Provisional protection only.*)—"Improve-"ments in cleansing ships' bottoms at sea, and in the machinery, "apparatus, or means connected therewith." This invention "consists essentially of a knife or scraper fixed to the end of a "moveable lever which is immersed in the water, and extends "transversely under the bottom of the ship as far as the keel. "The outer end of this lever is fixed by a moveable joint to a "rod or lifter which passes up in a nearly vertical direction, and "its upper end works in a guide which projects from a vertical "frame fixed by a clamp and pinching screw or screws to the "bulwarks of the vessel. To the lower part of the vertical rod.

" and near to that portion where the lever carrying the scraper is " situated, there is fixed a link to which is connected a rope, and " this rope passes up over a pulley and on to the deck, for the " purpose of being taken hold of by a man or by men.

"The entire apparatus is made portable, and when not required " for use is taken in pieces, lifted on board, and stowed away " into a comparatively small space. When it is desired to cleanse " the bottom of a ship or vessel, the apparatus is secured to the " bulwarks, and the rope fastened to the lifter is passed over a " pulley on to the deck, where it is hauled at by a man or men " on board, who pull the rope through such distance as to cause " the knife or scraper to pass over and cleanse a given portion " of the bottom, the distance passed over being ascertained by a " scale of lengths marked upon the lifter. When one portion of " the length of the vessel is thus cleansed, the apparatus is shifted " along the bulwarks, and a corresponding length is scraped " further on, so that by beginning to scrape at one end of the " hull, the apparatus is moved on successively until the entire " length is cleansed. When used for scraping the sides of the " hull, the lever carrying the knife or scraper is moved back so " as to be shorter, and thus it is more easily applied to work over " a vertical or nearly vertical portion of the hull."

[Printed, *4d*. No Drawings.]

A.D. 1864, September 22.—N° 2332.

LARCOM, WILLIAM.—(*Provisional protection only.*)—" Improvements in protecting the sides and bottoms of ships and " other structures of iron, and in materials to be employed " therein." The invention consists " in constructing a framing " of longitudinal and vertical batteries dovetailed, with the sides " bevelled and filled in with one of the compositions hereafter " described, or with a bituminous or other like suitable compo- " sition, upon which battens and composition I secure a sheeting " of copper. I fasten the battens to the ship or other structure " by means of one of my compositions, marine or Hay's glue, or " other suitable cement, and by means of screws which enter into " the plates, but do not traverse them. For protecting the keel " of ships I insert African oak or other hard wood under the " bottom of the keel, and secure it by means of copper carried " from the lowest longitudinal wooden battens. The whole sur-

" face of the plate is first coated with marine glue, Hay's glue, " or one of my compositions, and the battens are covered first " with coal tar and pitch, and then with tarred paper.

" My compositions for filling in the spaces between the battens " and for bedding the battens in are as follows:—No. 1, mineral " naphtha, Roman cement, boiled linseed oil and sand in about " equal proportions, together with more or less hair or fibre; No. " 2, Stockholm tar, Roman cement, pitch and sand in about equal " parts, and more or less hair or fibre; No. 3, waterproof glue, " sand, Roman cement, pitch in about equal proportions, with " more or less hair or fibre; No. 4, naphtha, waterproof glue, " pitch and coal tar in about equal proportions, and more or less " sawdust."

[Printed, *4d.* No Drawings.]

A.D. 1864, September 24.—N° 2346.

CLIMIE, DANIEL.—(*Provisional protection only.*)—" Improve- " ments in life boats." "I employ boats larger than ordinary " life boats, and suitable to carry an engine or pair of engines " about, say, ten or other number of horses' power. I make the " engine and boiler of the lightest construction, and if the boat " be propelled by means of one, two, or three screws it may be " convenient to employ one or more rotary engines; but if pro- " pelled by paddles, a reciprocating engine will be preferable. I " cover or deck in the compartment enclosing the engine and " boiler, and carry up trunks or channels from which air is drawn " for the supply of the fire and engineer, so that the sea may not " wash into that compartment, all other parts being water-tight. " The other parts of the boat may be open, or it may be decked " throughout as may be found most expedient; in either case " I provide air cells or compartments stuffed with cork or other " suitable material that will give the necessary buoyancy to the " boat even although some of her compartments become filled " with water. In order to better ensure against damage to the " engine compartment and the ingress of water thereto (which " would render the boat useless), I build her with a double skin " or bottom at that part, each skin or bottom being in itself " water-tight, and being disposed some few inches from each " other, although one part may become penetrated or strained, so " as to leak, the other skin may remain tight, and the utility of

" the boat preserved intact. The space between these skins may " also be filled up with cork or other suitable material.

" As a boat of this description must necessarily be larger and " heavier than ordinary life boats, and therefore more difficult to " launch from and draw up on the shore, I provide a cradle for " her on suitable wheels, according to the beach, and, if desirable, " ways may be laid down on which the cradle may travel in " launching or drawing her up.

" I prefer the boat to be built of sheet steel, as affording great " strength with lightness."

[Printed, 4d. No Drawings.]

A.D. 1864, September 27.—N° 2369.

CORNISH, George Bishop. — " Improvements in applying " copper, 'yellow metal,' or other metal sheathing to iron or steel " ships and other navigable vessels built of iron or steel." The invention consists, first, " in applying a sheathing of wood to " the vessel's bottom, and attaching the same thereto by means of " screwed bolts and nuts or headed bolts passing through the " planking and skin of the vessel, and, where convenient, also " the frame of the vessel. When the bolts are to be rivetted, I " prefer to drive them from the exterior, and rivet them on the " inner surface of the skin or frame of the vessel, taking care in " in this case, as well as when screwed bolts and nuts are used, " to countersink the heads on the outside, and then cover them " with wooden plugs, cement, or other suitable material, so that " no portion of the bolt head will be exposed; I then caulk the " seams, sheathe with tarred paper, felt, or other suitable material, " and apply the copper or other sheathing by means of nails in " the ordinary way.

" In some cases I prefer to attach the wood sheathing by " means of screwed bolts from the interior, in which case I prefer " to tap the holes in the metal skin of the vessel, and form the " bolts with a thread the whole length of their shanks."

In some cases also " I prefer to place felt or other like sheathing " between the metal plating of the vessel's bottom and the wood " sheathing."

[Printed, 6d. Drawings.]

A.D. 1864, September 28.—Nº 2376.

FORBES, Horace, and FORBES, Hugh.—" Improvements in " apparatus for steering ships or vessels." These improvements consist in constructing the rudder in two or more leaves, sliding or folding behind each other, and opening out or deploying at pleasure, so that when the action of the rudder is not required no impediment below the water line shall, when the rudder is folded, be offered to the transit of the ship; nor shall the ship be caused to bear to the right or the left by means of its steering apparatus. The several leaves of the rudder are perforated by a spindle or axle, which when it revolves half (or any portion of half) a turn to the right or left, at the same time, and to the same relative extent, opens out the leaves of the rudder to the right or left in a semicircular figure (or in a proportionate part of a semicircle); or the spindle need not be capable of revolving, in which case the deployment of the several leaves of the fan is effected by cords, chains, bands, or other suitable appliances; or the deployment and refolding of the fan can be produced by shoulders on the spindle, and corresponding grooves in the rings or collars which attach the leaves to the spindle, or vice versa, by having shoulders on the rings and grooves on the spindle. For those fans which, when folded, have the spindle end lowermost, " we " prefer that their leaves be buoyant in water, yet not so much " so as to require a great effort on the part of the helmsman to " depress them when they are caused by him to deploy; but for " those fan rudders which, when folded have their spindle end " uppermost we prefer that the leaves be nearly though not quite " buoyant." " The leaves of our fan rudder can be made either " flat, concave, or convex. We prefer to use them of a concave " form (having the radius of concavity forwards) for a fan placed " aft or at or near the stern post; for those placed forward on " the lower part of the cutwater we prefer the leaves to be flat. " The leaves of our fan rudder may be set to deploy at any angle " with the vessel's keel (stern post or cutwater); we prefer to use " the right angle for a rudder placed aft or at or near the stern " post, and an angle of 45 degrees from the direction of the " vessel's keel for a fan placed at or near the cutwater." When the rudder has been deployed it can be folded again by reversing the action of the spindle, which carries with it the leaf termed *the leader.* " Or the fan can be refolded by reversing the action

" of the cord, chain, or other appliance, by which the leader and " the leaves following it shall have been deployed. The leaves of " our fan rudder may be covered in part by a box or casing, open " at its sides or on that side where the leaves deploy. Upon " this casing should be a groove or slide with a shoulder (or " stop), against which the leaf furthest from the leader, and " consequently the last in that deployment, should be stopped by " its catch, and thus be prevented from issuing beyond the dis- " tance necessary for the complete deployment of the fan. If " the fan be built into the vessel, the sides of the compartment " will answer the same purpose as the above box or casing."

" Instead of placing at or near the stern post a fan rudder so " as to deploy either to the right or left as required, we rather " prefer a pair of fan rudders, one on each side of the stern post, " dead wood, or other stern part of the vessel, the rudder on the " left side being in this case made to deploy to the left, and that " on the right side being made to deploy to the right, and being " so arranged as not to be able both to deploy at the same time. " Each of the spindles of the above fan rudders would in this " instance rotate by separate rods, chains, or connecting appara- " tus, but both would receive motion from the same helmsman's " wheel."

" For the purpose of more speedily obtaining a deployed half " circle, two fan rudders can be placed on the stern post of a " vessel, the one fan perpendicularly above and contiguous to " the other, the upper one having the folded leaves with their " broadest ends uppermost perpendicularly above the spindle, the " lower one having its folded leaves lowermost and perpendicularly " below the spindle."

" In ships having broad bows our fans can be very well set " against and partially let into the cutwater, without when folded " their interfering with the vessel's speed, and they can be so " situated as to deploy at any desired angle (we prefer 45 degrees) " from the direction of the keel, the left one deploying to the " left and the right one to the right. The connecting rods, " chains, bands, or cords communicating motion from the helms- " man's wheel can pass either on the outside or inside of the " vessel. That the fan thus placed may occupy less breadth, we " prefer that the leaves of such fan rudders be narrow in shape, " and consequently more in number.

" *For vessels* with sharp bows we prefer that the fan be of

"fewer leaves, and that these be set close to the cutwater, and in "such a direction that the leaves on the left thereof pass in front "of the cutwater and" of "the folded right fan rudder, so as "to deploy to the right of the vessel; while the right fan in its "turn deploys its leaves across the front of the cutwater and of "the left fan, which must be folded. If the ship's bows be "extremely sharp, as is the case with some constructed of iron, a "less angle than 45 degrees with the direction of the keel may "be advantageously used, and we also prefer that in this case "the motion be communicated to the fan by apparatus passing "from the helmsman's wheel and through the inside, rather than "along the outside of the vessel."

"Our fan rudder can be put on the front of the cutwater, "having the deploying side of its leaves towards the front (or "direction of the ship's course), and the casing being on a pivot, "can be caused, through the action of the helmsman's wheel, to "turn or face so as to bring the deploying fan to any desired "angle with the vessel's keel, and at the same time to deploy the "leaves either to the right or left."

"Whenever it be desired that a stern fan rudder (or stern fan "rudders) should be made to deploy at any other than a right "angle with the direction of the ship's keel, or it should be "desired to have a fan rudder on a pivot to face right or left and "deploy at any angle, either of those which we have described in "connection with the forward part of the vessel can be applied "to the stern."

Though no claim is made for any machinery connecting the helmsman's wheel with the fan rudder, some methods are described.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1864, September 28.—N° 2387.

DENNE, THOMAS JAMES.—(*Provisional protection only.*)—"An "improved method of protecting the sides and bottoms of iron "ships and other submerged iron structures." The invention consists "in protecting the sides and bottoms of iron ships and "other submerged iron structures by securing thereto at inter- "vals ribs of wood, fixed by angle irons screwed to the iron "plates, or in some cases let into seatings formed on the plates "and with the wood held between two angle irons or in the

" seatings. The screws attaching the angle irons to the iron " plates may or may not penetrate through them, or the angle " irons may be rivetted to the plates; then I place solid blocks " of cork, which come up to the level of the wooden ribs upon " the iron plates, and cover all with copper, the wooden ribs being " so placed as to receive the ends and sides of the copper plates, " and to receive the nails necessary for holding them tight on to " the structure. Instead of solid blocks of cork, I sometimes " use blocks or sheets composed of kamptulicon or of cork and " gutta percha, or of cork and caoutchouc."

[Printed, 4*d*. No Drawings.]

A.D. 1864, September 30.—N° 2405.

VINE, JAMES.—(*Provisional protection only.*)—" New or im- " proved arrangements for giving buoyancy to and facility for the " propulsion of ships, vessels, or floating bodies." " I construct " cylindrical boxes or pontoons, hereafter termed pontoon wheels, " which are to be inflated or filled with air or with buoyant gases " or vapours if preferred, the outer circumferences of the said " pontoon wheels being provided with floats or with propelling " blades if preferred, the same being connected to and actuated " by a steam engine or other motive-power engine. The said floats " or propelling blades may be hinged to the said pontoon wheels " so as to feather or present either their narrow or broad surfaces " to the water in order that they may not offer any resistance to " the water and yet receive the effect of the same, and thus " facilitate the propulsion of the " vessel. The said pontoon wheels may be applied at each side of the vessel, four or six of them, for instance, that is, two or three on each side, connected in pairs, by axles passing through the ship or floating body, and supported by suitable framing of wood or iron situated within the same. Or the ship, vessel, or floating body might, if thought desirable, be merely raised and placed on a number of such axles situated beneath its bottom. In addition to the pontoon wheels, or instead thereof, " I use sails made as bags to be inflated with " air, buoyant gases, or vapours, the said bags being furnished " with air valves so as to permit of the air, buoyant gases, or " vapours being removed when the ship or vessel is lying in a " port or dock, or when these aforesaid sail bags are not required, " and being also furnished with cords, ropes, or other suitable

" apparatus, whereby they may be lowered so as to be out of the " way in a storm, or when not required."

[Printed, 4d. No Drawings.]

A.D. 1864, October 6.—N° 2453.

BROWN, THOMAS.—" An improved cap designed for increasing " the upward draught of chimneys and for ventilating ships and " buildings." This improved ventilating cap consists of an inner and outer cap, the inner cap being closed at the top, and having apertures at the sides protected by the external cap, which is open at the top and bottom, the sides of the two caps being inclined and adapted to each other and to the current of external air, so as to insure the deflection or reflection of the outer and the free passage of the inner current from the building, chimney, or place to be ventilated.

In applying this apparatus to a ship, the ventilators " are applied " over the forward hatchway, engine-room, and after saloon, and " the chimney caps over the smoke pipes."

The peculiar construction of this chimney cap or ventilator prevents an external current of air passing through the apertures, in whichever direction the same is moving, and always secures an unopposed passage of the smoke, dust, or vitiated air either up or down the space between the two cap pieces, according as this current of air strikes the apparatus from a quarter above, or below a horizontal plane. Should the current be moving in a direction at right angles to the sides of the cap-piece, the smoke or vitiated air will readily pass out through the top or bottom of the intervening space. When the external current descends upon the top of the apparatus it divides, passing down this space with a force proportionate to the velocity of the current, and thereby creates a vacuum in the flue or opening on the principle known as " induced currents," which vacuum is quickly filled by smoke or vitiated air, and a strong draught is obtained. When the said current ascends, passing up the space, a similar result is obtained.

[Printed, 10d. Drawing.]

A.D. 1864, October 7.—N° 2473.

CHAPMAN, CHARLES.—" Improvements in life boats." Boats constructed " according to my invention cannot remain in any " position but keel downwards; and if by any shock of the

" waves they are momentarily diverted from such position they " again and instantly resume it."

The invention consists in constructing life boats in three parts or portions, a stem and a stern portion (open or uncovered, and fitted as usual with seats, row-locks, and, if necessary, with masts and sails,) and a middle part or portion consisting of a longitudinal cylindrical, or barrel-shaped chamber running lengthwise along the boat in a line with the keel, and forming part of the hull. The cylindrical or barrel-shaped chamber may be formed by building a double roof over the centre or midship portion of the boat, and extending it fore and aft, the space between the inner and outer roof being so constructed as to form water-tight cells or air compartments. In a boat constructed according to this part of the invention, the cylindrical or covered portion may only be at the midship part of boat, say for about one-third of the boat's entire length, and the boat may be worked from the open parts at stem or stern, or the roof may be extended and seats placed in the interior of the cylindrical or barrel-shaped chamber for the rowers, and the oars worked from about their usual positions. The cylindrical or barrel-shaped chamber may also be built of tubes placed either longitudinally or diagonally.

The improvements consist further "in constructing my im- " proved life boats in some cases in such manner that the " herein-before mentioned cylindrical or barrel-shaped chamber " may be free to rotate when struck by a sea, thereby taking off " the shock from the boat." The interior of the chamber may be fitted with seats hanging from the shaft, which seats will in any position of the boat retain their upright position. The keel forms one strong continuous girder running throughout the length of the boat, and, together with the shaft, retains all the parts of the boat securely in position. "Should it be found necessary, " however, to give the boat additional strength, the ribs, plank- " ing or plating, or a part or portion only thereof may be con- " tinued along the outside of the said chamber, and a rib or " ribs of iron or other metal or material may be carried along " from stem to stern throughout the boat at either side, thereby " uniting the whole into one rigid structure capable of with- " standing any shock to which it may be exposed by the action of " the sea."

[Printed, 1s. Drawings.]

A.D. 1864, October 7.—N° 2478.

JACKSON, ADDIS.—(*Provisional protection only.*)—" Improvements in constructing and arming ships and other vessels or " floating bodies." " The war ship or vessel is so constructed as " to have three separate keels." " Around the entire ship or " vessel is a casting of woodwork. This casing, which is divided " into numerous compartments, extends downwards to the two " outside keels, and upwards vertically to the line of floatation; " it then inclines inwards towards the armour plating, the angle " of such inclination being suitable for allowing the guns imme- " diately above to be depressed to a greater extent than has " hitherto been practicable in any ships or vessels of war. The " armour plates are placed perpendicularly, and extend upwards " from the inclines a sufficient distance to allow guns of the very " largest description to be worked within them from between the " upper and second deck, and they extend down to about five " feet below the water line. In the event of an armour plate " becoming injured, the compartment opposite the plate so injured " would have the pieces of cork or any other suitable buoyant " material with which it is filled removed therefrom in order that " such plate may be removed, which may then readily be done by " withdrawing the bolts or screws, such compartment of the " outer casing then serving as a place for the men to work in."

" All the armour plates are of precisely the same form and " dimensions, and are all precisely perforated with the same " number of screw or bolt holes, so that any one plate may be " substituted for another.

" The exterior casing at the stern of the ship or vessel extends " considerably over or outside of the rudder, so as to protect it from " injury by vessels being driven into it or otherwise. Around the " outer casing is a strong strip or girdle, which acts as a 'fender' " to the ship or vessel; it is so placed as to bear upon solid " portions of the timber of which the ship is composed.

" The large guns are mounted on carriages which work on " inclined tramways."

The port-holes, although only of sufficient width to allow of the free passage through of the muzzles of the guns, are of much greater length vertically, to enable the guns to be considerably more elevated or depressed than any guns hitherto employed, the lateral movement of the guns being governed by the movement of

the vessel by means of the rudder and side screws. "The port-" hole, when not in use for firing, is enclosed by a plate of similar " dimensions to the other armour plates, but is hinged at the " upper portion thereof so as to be capable of opening outwards; " this opening out of the port-hole doors may be caused by means " of an arm extending upwards from the door itself, and cords or " chains with counterbalance weights or a toothed sector and " pinion, or worm and worm wheel may be used in lieu thereof if " preferred. The perpendicular armour plates are perforated, by " preference, at their junction a suitable height from the second " deck to allow of riflemen using them to fire through, these " holes or openings being formed conically to allow of aim being " taken, they also aid in ventilating the ship; there are also " numerous holes formed in the upper deck for a similar purpose.

" The upper surface of the upper deck is formed into ridges " and furrows by ribs or pieces placed equidistant apart from " each other. The openings are formed in the ridges whilst the " furrows serve to carry off water." There is a "conning" tower, which it is preferred should be slightly conical. The tower is composed of strong timber bound together by iron hoops or bands, like a pail inverted, and is plated with perpendicular plates, similar to those already described, and the top or deck of the tower is also similar to the top deck already described, with ridges and furrows.

" The ship or vessel is propelled by two screws on the same " screw shaft, each screw consisting, by preference, of two blades; " they are placed a considerable distance apart from each other, " and in the circle they move in they are so arranged as to be " 90° in advance of each other. In addition to these two screw " propellers on the same shaft, two other screw propellers are " employed, arranged one on each side of the middle keel, and " working in the spaces between the middle and outer keel; these " two propellers work in an opposite direction to the others. " They also assist in steering the vessel, they being worked by " separate engines. Two other propellers are also employed; " they are placed about midway between midships and the bow " of the vessel. The axis of these last-named propellers, instead " of being paralled with the centre keel, are placed at an angle " thereto, the one on each side thereof; this is for the purpose of " assisting the turning of the ship, and also to assist in increasing " the speed of the vessel when moving forward to act as a ram, " or otherwise.

"The constructing a vessel as described with an outer casing "filled with cork or other buoyant material, and the outer strip "or fender projecting beyond entirely around the vessel, and the "water being allowed to flow into the casing filled with cork or "other buoyant material, great steadiness and floating power to "the vessel is ensured." "The prow of the vessel is formed with "a strong spike or spur inclining upwards, so that by being run "end on to a vessel the spur or spike would tear open, and do "considerable mischief to the bottom of the vessel run into. "The upright or stern is formed serrated or toothed in such "manner that anything being struck thereby would almost "inevitably be cut in two."

[Printed, 4d. No Drawings.]

A.D. 1864, October 18.—N° 2567.

PAUL, ALFRED, and PAUL, EDWIN.—(*Provisional protection only.*)—"A new or improved hydraulic rudder break." The mode of construction of the break "may be varied to suit par-"ticular cases or circumstances, the simplest and most general "applicable mode being the rotary, which is as follows:—To the "tiller or arm which may be fitted to a rudder head (if made of "wrought iron) there are to be fitted or forged two round arms, "of any required size, branching off one from either side of such "tiller or arm, which arms are to be bent or made to a regular "curve of any required radius, the centre of which will be the "centre of the rudder head. The length of such arms will be "determined by the maximum motion which the rudder to which "it may be attached may have. There is also to be a hollow "circular cast-iron or other metallic chamber, corresponding in "radius to the arms herein-before described; such chamber, when "furnished with proper stuffing boxes at the ends, and with a "suitable cock in the middle of it, having also the aforesaid arms "placed partially in it, with their arc the reverse way of the "chamber, is securely fixed to a strong foundation or sole plate, "which will have a set of metal blocks fitted to serve as guides "for the rudder head when such sole plate is fixed to the deck. "In close proximity, or attached to the said chamber near to or "above the said cock, there will be a suitable (necessarily a small) "tank which will be capable of containing sufficient water to "make up for (for any required time) the loss of water which the said chamber may sustain by leakage and evaporation."

When it is required to fix the helm in any position, so as to bring the ship about without the man or men having to hold on at the steering wheel or helm, it is manifest that all which it is necessary to do is to close the cock in the chamber, for by so doing the chamber is divided into two distinct compartments. The communication between the chamber and supply tank will also be closed by the same operation.

[Printed, 4*d*. No Drawings.]

A.D. 1864, October 20.—N° 2588.

KEY, TURNER POWELL ASTON.—(*Provisional protection refused.*) —" An improvement in the mode of fastening armour plates to " vessels of war." Instead of making " the holes through which " the attaching bolts pass cylindrical, I make them slightly coni- " cal," " the larger end of the cone outwards; I also cone the " upper part of the bolt to correspond with the hole in the armour " plate; a draw of about 1 in 20 will be sufficient, though I do " not confine myself to that amount. The interior of the coned " hole is then brought to welding heat by means of one or more gas " jets; the head of the bolt is also brought to a welding heat and " inserted in the plate hole, it is then driven home by hammer " or pressure," " hydraulic or otherwise. I prefer to use a hollow " (annular) holding-up apparatus to prevent bulging the interior " of the plate during the sending home of the bolt; the outer " end of the bolt if not quite flush may be dressed afterwards.

" What I claim is the welding the bolt to the plate by using a " conical hole in the plate, a conical-headed bolt bringing both " parts to welding heat and completing the weld by pressure or " impact."

[Printed, 4*d*. No Drawings.]

A.D. 1864, October 24.—N° 2628.

HOOKHAM, RICHARD.—(*Provisional protection only.*)—" Im- " proved powder magazines and receptacles for storing or keep- " ing gunpowder or other explosive materials, and improved " vessels and vehicles for transporting explosive materials from " place to place." The invention consists " in the construction " of water-tight impermeable magazines or receptacles for gun- " powder and other explosive materials which are to be supplied " with water or non-inflammable media, and in these water-tight

" magazines or receptacles waterproof or impermeable powder " casks or cases are to be placed, in which the gunpowder or " explosive material would be contained.

" In order the more perfectly to insure the powder or explosive " materials against any chance of ignition and explosion, I would " provide for the surrounding of the said casks or cases by the " water or non-inflammable media, by supporting or suspending " the same by means of framework or supports of suitable metal " or material, so that each cask or case will be kept from contact " from the top, bottom, and sides of the magazine or receptacle, " and from each other. Such a receptacle being mounted on " wheels would form a carriage or vehicle of conveyance, and with " handles would be suitable for being placed in and removed from " vehicles, or in and from vessels, as ships, barges, and the like. " Or vessels might be constructed with such receptacles forming " part of their structure."

[Printed, 4*d*. No Drawings.]

A.D. 1864, October 26.—N° 2645.

DANNATT, James.—" An improved composition for preventing " the fouling of the bottoms of ships and vessels, and for the " preservation of the iron or wood of which the same are con- " structed." " The composition is formed of resin, tallow, and " corrosive sublimate, the proportions of the several ingredients " which I prefer being approximately as follows :—Resin, ten and " a half parts; tallow, three and a half parts; and corrosive " sublimate, two parts, the same being intimately mixed together." " The proportions of resin and tallow may be varied according to " the circumstances under which the composition is to be em- " ployed." The composition is applied or laid on to the bottoms of ships and vessels in the same way as paint.

[Printed, 4*d*. No Drawings.]

A.D. 1864, October 26.—N° 2647.

WILTON, Robert William.—(*Provisional protection only.*)— " Improvements in the construction of roofs, walls, partitions, " bridges, fences, floors, and the ribs or framing of ships and " boats." This invention consists "in bending the ribs used in " the above constructions into a serpentine form, so that the " sides of the adjoining ribs touch each other at certain points

" where they are joined together by bolts, rivets, or otherwise. " Also in a variation of the same principle which consists in the " intertwining of screw-shaped coils of metal or other material, " and used in the same manner as the serpentine ribs."

[Printed, 8*d*. Drawings.]

A.D. 1864, October 28.—N° 2672.

AGER, GEORGE. — (*Provisional protection only.*)—" Improve-" ments in protecting the bottoms and sides of ships and vessels." The invention has for its object " the protection of the bottoms " and sides of seagoing and other vessels by preventing the " adhesion thereto of all animal or vegetable matter.

" For this purpose I sheath the bottoms and sides of the ship " or vessel to the required height with plates of sheet lead of " suitable size and thickness. These plates I attach to the ship's " bottom and side by means of cement, marine glue, or other " suitable adhesive matter, or by rivetting, soldering or other " known means."

[Printed, 4*d*. No Drawings.]

A.D. 1864, November 5.—N° 2746.

HASELTINE, GEORGE. — (*A communication from William Brainard Barnard.*)—" A new mode of fastening rivets, screw " seats, or other similar devices in metallic plates, and also of " securing thereby copper sheathing upon iron vessels." The invention " consists primarily of a novel mode of contracting the " rim or neck of a hole or cavity which has been drilled or " punched in a metallic plate, so that it shall embrace the pin or " rivet, or overlap the screw seat which may be placed therein, " and thus securely clinch and fasten the same. It consists " secondly in the use of rivets or screw seats so secured to unite " and fasten together metallic plates or bars, or the copper sheath-" ing upon iron ships in the manner herein-after particularly " described."

The punch used for the purpose of contracting or countersinking the edges of the cavities in which the rivets are to be secured, is made of a suitably tempered metallic bar, having its lower end bevelled off to a point, or rounded off in a convex form, so as to fit upon and into the mouth of the cavity to be countersunk. A recess is drilled longitudinally in the centre of this convex end

of the punch, equal in diameter to the size of the pin or rivet to be secured in the cavity, and equal in depth to the length of the projection of such pin or rivet.

Having inserted a rivet in a simple cylindrical hole drilled or punched in the metallic plate (but which does not extend entirely through the plate), the hollow punch is placed over the projecting end of the rivet, so as to rest upon the rim of the hole; a blow is then struck upon the punch, causing it to drive in or countersink the rim of the cavity around the rivet, so tightly and closely as to grip and hold even a straight rivet with great firmness. To ensure perfect security, the lower end of the rivet may be enlarged, so that the neck of the cavity, when contracted as described, shall in a measure overlap the same. A screw seat may be likewise readily secured in a metallic plate by overlapping the rim of a cylindrical cavity thereon.

"This improved mode of securing rivets in metallic surfaces is " especially adapted to the purpose of uniting plates where it is " desirable that one of them should present an unbroken exterior " surface, and that there should be no perforations through the " same, as, for instance, in the armour of an iron-clad vessel or " in the joints of heavy steam boilers. If the iron plates of the " turrets in iron-clad vessels be secured by means of bolts fixed " upon the outer side of the inner plates in the manner herein- " before described it is evident that all danger to the inmates of " the turret during an action from the loosening of the bolts will " be prevented, as they cannot in any event fly inwards.

" Again this improvement is peculiarly useful in the sheathing " of iron-clad vessels with copper, for it admits of the entire insu- " lation of the rivets as well as of the sheathing itself." This is effected, where copper rivets or screw seats are used, by surrounding or enclosing the end of the rivet, or the entire body of the screw seat, in an envelope or coating of rubber, paint, or other suitable insulating material before placing it in the cavity, which insulating material will not be displaced by the countersinking or clinching-in of the rim of the cavity around the same. By using screw seats of ebony, vulcanite, or other non-corrosive material instead of copper, the separation and insulation of the copper screw to be used therewith from the iron plate would be complete, and the fastening thereof still be perfectly firm and secure.

"To effect an insulation of the sheathing in connection with " the mode of securing the copper sheets by means of the rivets

" herein-before described, a thin sheet of india-rubber or gutta " percha," or a coating of some suitable adhesive paint or cement may be placed between the copper sheets and the iron surface of the vessel.

By the use of screws and screw seats in fastening on the copper sheets, the ready removal and replacement of the sheathing, or of any portion thereof, may be easily accomplished without injury to the hull of the vessel, or the expense of forming new cavities therein.

[Printed, 8*d*. Drawing.]

A.D. 1864, November 9.—N° 2781.

ROBINSON, John.—(*Provisional protection only.*)—" Improve- " ments in the construction of ships and other navigable vessels." This invention has for its object certain improvements in vessels with flat, or nearly flat, bottoms, diagonally planked, and without vertical timbers.

In constructing a vessel according to this invention the keel is laid on the blocks in the usual way, but is formed without rabbets or " indrest." The stem and stern posts are then set up, each of which is constructed with a good large apron, and indrest thereon. Having determined the shape of the bottom, temporary floors are placed across the keel at about every eight feet, which temporary floors are cut to the requisite length, and made fast to the keel, and the outer ends are so level as to enable logs to be turned round against the ends of the floors on both sides from the stem to stern post.

" For a vessel of about, say, 150 tons burthen, these logs may " be about fifteen inches square, or larger if desired. The ends " of the logs are fitted into the stem and stern post, and bolted " through and through." " The planking of the flat of the bot- " tom of the vessel is of three thicknesses, the two first of which " cross each at an angle of about 45 degrees to the keel, and ex- " tend right across the flat of the bottom of the vessel. The " third or outer thickness is laid longitudinally fore and aft."

" The outer ends of the first or upper tier of the diagonal " planks take into rabbets formed in the inner sides of the logs, " about three inches deep, and the ends of the second tier of " diagonal planks overlap the first tier, and take into a second " rabbet of, say, six inches deep from the internal vertical line of

" the logs. The third and outer thickness of planking is laid
" longitudinally fore and aft. The edges and ends of the two
" outer planks are fitted into a third rabbet formed in the
" inside of the bottom of the log, and overlap the second tier of
" diagonal planking, say, about one inch and a half, and the ends
" of the other longitudinal planks, which are laid fore and aft, also
" take into a continuation of the said lower grooves or rabbets.
" The three thicknesses of planking forming the flat bottom of
" the vessel being now securely fastened together by vertical
" trenails, or in any other convenient manner, the temporary
" floors are removed."

" A pair of small sister logs or clamps are placed on each side
" of the vessel, one being placed on the bottom, and bolted to
" the main log, and the other on the top, and which is also
" bolted to the main log." The lower ends of the side planking, which is also diagonal, take into grooves formed in the outside of the logs, each thickness of planking overlapping the other, say, about three inches, in the same way as the planking of the flat bottom.

" When the shearing down for the gunwale is done, two, three,
" or four longitudinal streaks, extending fore and aft, are turned
" over the outside of the heads of the diagonal planking, the
" lower edge of the lower and upper edge of the upper streak
" being let in, say, one inch, for the purpose of making a
" good abutment and a stop for the oakum in caulking. Two or
" three streaks as clamps are fitted round the inside of the vessel
" to receive the ends of the deck beams, and to form longitudinal
" ties; these are bolted through and through the outside plank-
" ing, also up and down through each other at, say, every three
" feet. When the diagonal planking of the vessel is carried up
" to form the bulwarks, a plank of about, say, nine inches wide,
" and about two inches and a half in thickness, is turned round
" underneath the rail inside and out, and which is let into the
" diagonal planking, say, about one inch and a half at each side,
" when the whole is surmounted by the rail.

" The waterways are fitted on the top of the deck beams, and
" up against the diagonal planking, and which waterways are
" cogged or dovetailed to the beams, and well bolted through
" the diagonal planking, and the outside fore-and-aft streak of
" plank; then fit a gunwale from the outside up against the
" waterway on top of the heads of the diagonal planking;

" stantions of iron are then secured on the top of the waterway, " or wooden stantions may be bolted to the inside of the inside " planking to receive the rail and bulwarks.

" The keel may be fitted against the second or lower thickness " of diagonal planking, in which case the fore and aft planks or " garboard streaks may be fitted into rabbets formed on the sides " of the keel, or in the case of small vessels, such as flats or " lighters, where the draught of water is a consideration, there " may be a thickness of four-inch plank used, instead of the " keel."

"The main hatch beams it is preferred to construct double, " and truss them according to the Specification of Patent granted " to the applicant, dated 4th December 1862, and N° 3256, and " if found necessary the deck beams may be strengthened by " trussing."

[Printed, 4d. No Drawings.]

A.D. 1864, November 10.—N° 2792.

RUTHVEN, Morris West. — "Improvements in steering " apparatus." This invention consists "in the application of " apparatus to a rudder in such manner that the pressure of the " water in bringing the rudder back into a line with the keel " shall be stored for use, and applied to aid the steersman when " again putting over the rudder."

" In all cases I prefer to employ a lever connected by a suitable " connecting rod or link to the tiller, such lever turning on a " fulcrum or axis at one end and having the weight or spring " attached to the other end, but this may be varied. The action " of the weights or springs on the tiller may be arranged to be " constant, whatever be the speed of the ship or vessel, or when " desired provision may be made in order that the weights or " springs may offer a greater power in aid of the steersman when a " ship is moving through the water quickly than when it is mov- " ing slowly through the water, and such adjustment may be" made " by varying the leverage from time to time as required, or by " otherwise increasing or decreasing the action of the weights or " the effort of the springs employed, but in all cases it is pre- " ferred that the effect of the weights or springs used should be " somewhat less than the pressure of water on the rudder, in " order that the pressure of water on the rudders may be capable " of lifting the weights or of compressing the springs."

"The form of spring used may be varied, and it may be of
" steel or other metal, or it may be of condensed air, which may
" be arranged to act directly on a piston, or indirectly by having
" water or other fluid interposed between the piston and com-
" pressed air contained in a suitable vessel. When using com-
" pressed air acting with an interposed fluid, the pressure of the
" air may be readily varied by the aid of a small force pump, and
" a valve to allow the escape of the air from the vessel containing
" the condensed air and fluid. Where using weights or springs
" which are constant in power, their effort may be varied in
" respect to the lever" by varying the position of the fulcrum of such lever, or by varying the point of connection of the weight or spring to and from the fulcrum of the lever. When moving sternwise, the direction of the action of the stored power may be arranged to be reversed, but it is preferred that the lever should be arranged to be detached from the tiller where the vessel is moving sternwise.

[Printed, 6*d*. Drawing.]

A.D. 1864, November 11.—N° 2799.

HENTY, GEORGE ALFRED.—(*Provisional protection only.*)—
" Improvements in the building or manufacture of torpedo
" rams." "The torpedo ram to be an ordinary iron clad ship, of
" any form or size, propelled by steam or other power, and
" furnished with the apparatus further specified, which can be
" applied either to existing ships or to vessels built specially for
" the purpose." In the bow of the vessel, and parallel with her keel, are placed two chambers, one on each side of the stem. These chambers are placed below the water line, the top of the chamber being from four to ten feet below the surface, and the bottom of the chamber to extend as far down as possible to the bed of the ship. The chambers to be closed in front by sliding valves, as nearly as possible flush with the external skin of the vessel.

Each chamber to open internally in the vessel by doors or valves capable of closing, so as to prevent the ingress of water to the ship herself when the external valves are open, and the chambers consequently full of water. The chambers to be constructed of iron. Each chamber to contain a torpedo of sufficient size to hold the requisite quantity of powder, and a sufficient quantity

of air to make it about the same weight as an equal body of water. " Each chamber to be furnished with a series of long rods of iron " or steel, of sufficient strength passing through it into the ship, " and lying parallel to the keel thereof, and supported by rollers " at intervals. These rods to be placed beneath each other, so as " to enable the torpedo to be run out at any desired depth in " proportion to the depth at which it may be desired to strike an " enemy. The torpedo being attached to one or more of these " rods, and the inner doors being closed, the outer valves of one " of the chambers are opened, and the torpedo run out on the " rods when approaching an enemy to a sufficient distance, so " that when it explodes it may, while destroying the enemy do " no damage to the torpedo ram herself." "The explosion having " taken place, the rod or rods, or such part of them as remain, to " be withdrawn into the ship, the external valves closed, the water " pumped from the chamber, the interior doors opened, and a " fresh torpedo lowered into the chamber and attached to the same " or other rods, and in this way the torpedo ram may be enabled " with her alternate chambers to strike and sink any number of " ships in succession."

[Printed, 4*d*. No Drawings.]

A.D. 1864, November 11.—N° 2814.

HECKETHORN, Charles William.—(*Provisional protection only.*)—" Improvements in the means of and apparatus for work- " ing ships' pumps, and for preventing vessels from foundering." " I propose to construct and fix on the deck of the ship or vessel " suitable standards or uprights, for the purpose of holding in " bearings a crank shaft; this shaft is for the purpose of working " the ship's pumps in the ordinary manner of operating by cranks " and connecting rods; but in order to obtain motive power " necessary for the purpose, I attach to the middle of the shaft a " series of windmill sails or fans in a vertical position, so that " their revolution shall cause the rotation of the shaft. The " windmill sails may, however, be arranged in a horizontal posi- " tion if more convenient, and be made to drive the shaft by " bevelled gearing or toothed wheels. In addition to the water " pumps I propose to use a pump or pumps for forcing air, such " pump being also worked by the crank shaft; the object of such " air pump is to inflate a series of flexible bags or receivers, which

"are placed in the cabins or other vacant spaces in the vessel; "these bags are folded up, or kept in an empty or collapsed state, "so as not to occupy much space, and are connected with the "force pump by means of flexible tubes or hose. The" object "of these arrangements is, that when a vessel is in a sinking state, "or in danger of foundering from a leak which the pumps cannot "keep down, the bags may be inflated with air from the force "pumps, and thereby prevent the vessel from actually sinking "below the surface of the water. These bags may also be "attached to the upper deck within the gunwales."

[Printed, 4d. No Drawings.]

A.D. 1864, November 30.—N° 2985.

CAUNTER, Henry.—"Improvements in preserving ships' "bottoms and other surfaces under water, and in preventing the "formation of barnacles and other accumulations thereon, which "improvements are also applicable as a preservative from the "effects of moisture or damp, and as a cure or prevention of the "scab in sheep and a protection to them from the effects of damp "and exposure." The improvements relate to employing for the above purposes the tar or greasy matter produced by distilling peat combined with water. "For this purpose I mix the tar "or greasy matter and the water in a mixing mill or other suitable "apparatus in the proportion of about 3 parts of the product "from the peat with about one part of water, but I do not "confine myself to these proportions."

"The composition obtained may be applied either in a cold or "warm state by means of a brush or otherwise or by immersion. "In some cases, particularly for hot climates, I prefer to add to "the composition a small proportion of vegetable or mineral tar or "other resinous substance. In some cases the crude tar or grease "from the peat may be employed combined with the tar or other "resinous substance without water in proportion variable with "the temperature to which it may be exposed."

[Printed, 4d. No Drawings.]

A.D. 1864, December 5.—N° 3029.

NEWTON, William Edward.—(*A communication from James Buchanan Eads.*)—"An improved method of operating guns in "fortifications and floating batteries, and in the construction of

" rotating towers for the same." The invention consists, firstly, in supporting a gun at two different points in its length by a combination of levers or other equivalent devices adapted to a gun carriage, and acting in connection with each other, so as to rigidly compel the gun, whenever it is moved in a vertical plane, to oscillate about a point in advance of the levers, and at or near the muzzle of the gun.

Secondly, in controlling the horizontal movements of the chassis or lower carriage, which supports the gun carriage, by a combination of bevilled toothed wheels, racks, and screws acting in connection with each other, so as to rigidly compel the longitudinal axis of the chassis, whenever moved horizontally, to rotate about a central point at or near a vertical line drawn through the exterior of the centre of the port-hole, the centre of rotation being in advance of the chassis and the mechanical arrangements which control its movements, so that the centre of motion may be on the exterior side of a vertical defence wall, while the chassis and mechanism are on the interior side or some considerable distance from the centre of motion,

Thirdly, in the use of the hollow central pivots as a channel for the conveyance of steam or other power to operate the gun.

Although the gun, gun-carriage, and chassis can be worked by means of steam power transmitted through the axles, yet all the advantage of the small port-hole may be obtained by working the various parts by the simplest applications of hand power. The chassis may be moved from side to side, and the gun may be run into battery by pullies and ropes, or by any other well-known means, and the vertical levers which lift the gun may be actuated by hand screws, hydraulic jacks, or in any other manner.

Fourthly, in the mounting of one or more guns on a rotating platform, when the power to direct the aim of the same, or to run them into battery, is conveyed through the axis of the platform's rotation.

The rotating platform could be partially or entirely surrounded by the walls of the fortification, the axis of its rotation being placed in the centre of the walls. By piercing the walls with port-holes facing different points of the compass, the gun may be made to command any part of the horizon by rotating the platform, so as to bring the gun directly opposite any port-hole that may be desirable. The platform may be supported upon rollers or wheels, placed at different points near its circumference to facilitate its

rotation, and to prevent it from being strained by the weight of the guns. It may be rotated in the same manner as revolving turrets or as turntables on railroads are turned. The platform may be large enough to have two or more guns upon it, and these may be placed on opposite sides of it, or may be placed side by side and trained separately, as may be desired. If it should be desirable to employ cylinders for steam, air, or other element on the platform, for the purpose of running the guns into their ports and to check their recoil, the steam or other element may be brought through the shafts, by making these shafts hollow and of sufficient size to receive the necessary pipes, and rotate around them. The axes of the steam-tight joints and the steam pipes must be coincident with the axes of rotation, so as to admit of the horizontal parts of the pipes rotating with the platform and chassis. The piston rod of the cylinder would be attached to the gun-carriage to move it backwards and forwards on the chassis or truck.

The circular wall may rest upon a circular bed, on which it may be rotated independently of the platform and guns within it, by means of hydraulic cylinders placed outside of it, and protected by a glacis; or within it near its base; or by toothed pinions working into a circular rack attached to the wall at or near its base; or by other strong and simple and well-known devices, and moved by suitable engines or machinery. The great advantage of this arrangement would be that, in case an enemy's battery obtained a position enabling him to injure the part of the wall exposed to his fire, that portion, if injured, could be turned out of the reach of his guns, and could be repaired in safety without interfering with the ability of the fort to return his fire. In this manner the walls of the fort could be kept in constant good order, while replying with unabated vigour to the fire of the enemy. A fort thus constructed with such small port-holes, with port-shutters arranged to close from within, with loop-holes for musketry, and properly covered on the top, could not be taken by assault; whilst at the same time it would command the whole horizon with its guns, and would require but a few men to maintain the position. Its walls could be made of iron and could resist the most powerful guns, for they could be from three to five feet thick without interfering with the working of the guns or the rotation of the platform, if the guns used be of the usual length of large guns now in use.

[*Printed*, 1*s*. 4*d*. Drawings.]

A.D. 1864, December 7.—N° 3049.

HALL, ALEXANDER DALLAS.—" An improved compound for " coating the bottoms of ships and structures, wholly or partially " immersed in the sea or tidal estuaries, and in the system or " mode of preparing the same." " The ingredients employed for " producing the compound consist of certain portions of fat, " resin, vegetable and metallic matter, and these are used in " various quantities to meet the requirements of the material and " structure to which it is applied."

" The compound when used is applied in a liquid state to the " structure to be coated, and the ingredients which it is preferred " to employ to form it consist of tallow or other fatty substance, " the resin of commerce, linseed, or poppy or other suitable oils, " and copper in a state of crystallization, or salt."

It is preferred to use these substances in the following manner and proportions, viz.:—" I dissolve in an iron boiler equal parts " by weight, say 1 cwt. each of tallow or lard and rosin; when " these substances are liquified, one and a half parts by weight of " vegetable oil, linseed or poppy, are added, and the whole is " exposed to further heat and agitation. The liquid compound " is then run into a leaden or other suitable vault containing " water in a state of ebullition, and half a part by weight of a salt " of copper or zinc dissolved in a solution of sulphate of soda is " then added, mutual decomposition ensues, the solid mass is " then well washed in several waters and dried upon a steam or " other pan, and when these operations are completely carried " out the compound material is left in a state fit to be applied " to the purposes herein-before referred to."

[Printed, 4d. No Drawings.]

A.D. 1864, December 19.—N° 3142.

TATE, WILLIAM.—" Improvements in armour, and in making " and applying the same for protecting wood and iron ships of " war and batteries." The invention consists " in the use and " improvements in the manufacture and the mode of applying " iron and steel, flat and round wire, galvanized and ungalvan- " ized, rope, stranded flat belts or sheets, or woven or plaited " sheets or belts of any kind, of large and small size, wires, woven " wires in sheets, of round or flat wires applied singly in belts or " *sheets of iron or steel* wires or intermixed as one belt or sheet,

" being by preference one-third steel and two-thirds iron wire, " as armour for wood and iron ships of war and batteries used " singly or intermixed with sheets of millboard, leather, or com- " pressed cotton, or in conjunction with wrought iron or steel " plates of any dimensions. The iron or steel flat belts or " sheets should be manufactured to suit the full length of the " ships or batteries requiring the same, and from half-an-inch " up to any thickness upwards, and from four inches up " to any dimensions in breadth. These belts or sheets should " be laid on the one and a quarter inch iron plates, which " should be well secured and fastened to the twenty-one " inches of teak wood ship side, to be laid in tiers in conjunction " with millboard or sheets of leather well stitched to any dimen- " sions, or sheets of compressed cotton of any thickness, to be all " laid on in tiers as many as may be required, and when the " proper strength has been obtained, then planked over with " three-inch teak or other hard wood, all well bolted and screw " bolted through all to good fastenings inside skin of the ship " of war, and covered neatly over all with half-inch wrought iron " or steel plates twenty-four inches or more in breadth, or of any " thickness of iron or steel plates. Gutta percha may be used " if desired, in coating the millboard, leather, and cotton " compressed."

" I reserve to myself the right to use iron, steel, brass, zinc, " copper, and other wire, for the manufacture of flat or round wire " ropes, stranded rope belts, or wire woven or unwoven in sheets, " with the use of copper or zinc plates, and also the right to use " either flat wire ropes, or round wire ropes, or plaited wire in " sheets or ropes, that is, ropes of any and all kinds, with com- " pressed cotton, gutta percha, or other material which I claim as " being the invention herein-before set forth."

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1864, December 19.—N° 3147.

McKILLOP, Henry Frederick.—"Improvements in com- " positions for coating or covering ships." This invention is chiefly applicable for coating ships of iron. "In making com- " positions for this purpose, I grind together lime (by preference " pure shell lime), sulphur, and protoxide of mercury, and mix " with these coarse brown sugar and crude petroleum, or linseed " or other suitable oil.

"The proportions in which I prefer to combine these materials " are as follows:—1 cwt. of shell lime, ½ cwt. of sulphur, 14 lbs. " of protoxide of mercury, or crude mercury may be employed, " ½ cwt. of coarse brown sugar, 10 gallons of petroleum, or " other suitable oil, preferring 5 gallons of petroleum oil, and 5 " gallons of melted tallow in place of all petroleum oil.

"The sulphur is first heated to about 240° Fahrenheit, then " add the oil, and stir it well in together with the sugar, the " whole of the materials are then added and passed through a " mixing mill. I prefer slightly to slake the lime before grind- " ing it. The mixture thus produced will be of the consistency " of a thin cement and should be applied to the ship whilst hot, " or the mixture may be allowed to cool and be again heated " before applying it to the ship."

[Printed, 4*d*. No Drawings.]

A.D. 1864, December 23.—N° 3197.

SAUNDERS, EDWARD.—(*A communication from Frederick Saunders.*)—" Improvements in affixing armour plates to vessels " and other structures, and in bolts, screws, spikes, and rivets to " be used for these and other purposes." This invention consists in the substitution of screw and other bolts, spikes, and rivets, formed as described, for general fastening purposes, and amongst others the fastening or securing of iron and armour plates to marine and other batteries, ships of war and other vessels, in lieu of the solid metal bolts, spikes, and rivets as hitherto formed and used, which are liable to be either driven through, or shattered or broken by, the impact of heavy projectiles. I propose to make the body, shank, or centre part of the bolt, spike, or rivet of a number of wires, rods, or strands twisted or so placed together that in transverse section they shall possess the required tensile strength, and at the same time a considerable degree of elasticity, and to make the heads and ends or points solid, by beating and welding, hammering, or compressing the same.

Instead of welding or forging the wires to form the head of the bolt, they may in some cases be spread out and wedges driven in, so as to cause the whole mass to conform to the tapering hole in the plate, and then covered, if necessary, by any suitable kind of metallic or other packing.

[Printed, 10*d*. Drawing.]

1865.

A.D. 1865, January 12.—N° 105.

MOLL, RUDOLPH FREDERICK.—(*Provisional protection only.*)—"Improvements in apparatus for examining, cleaning, and repair- "ing the bottoms and sides of ships while afloat, which apparatus "is also applicable for other purposes." According to this invention instead of making the whole of a ship's bottom and sides accessible at the same time, as done in the dry docks, "I make "only a part (but any part) of a floating vessel's bottom and "sides under the water line accessible at the time by isolating "the part from the water line on the one side to the water line on "the other across the keel.

"This is intended to be done by one or more apparatus "made of two or more parallel flexible or elastic bars or sub- "stances connected at their outer parts with material which "bends and may be thin but must be sufficiently strong to "resist the pressure of the water. Such apparatus will accommo- "date itself to any vessel, but it is further intended to construct "another kind to be used for one particular or similar vessel only, "in the shape of a part of a false bottom (extending from side "to side) of such vessel or vessels; the solid or stiff parallel "beams are to fit the bottom and sides of the vessel, and the "inner part of said beams are, if found necessary, covered with "flexible, or elastic, or any other material in such a way as to "secure close or water-tight fitting.

"The apparatus is to be lowered into the water under that "part of the ship's bottom (passing from the stem or stern) to "which access is to be had, and the inner parts of the beams "drawn to the ships bottom and sides" "water-tight, and the "apparatus must be of sufficient extent to reach above the water "line on both sides.

"The apparatus thus fixed isolates the water it contains from "the water surrounding it, and by pumping the water out of the "apparatus an empty hollow girdle-like open space of air round "part of the ship's bottom and sides extending under and above "the water line on both sides will exist, making that part of the "bottom and sides accessible for all purposes, and it will also "keep the vessel afloat when damaged in that part. The cover- "ing part of the apparatus, although flexible in the one direction,

" must be sufficiently rigid in the other, or otherwise supported " to resist the pressure of the water on the exterior. This appa- " ratus, in addition to being used for access to a ship's bottom, " may also be employed for the application of metal plates or " other forms of iron to ship's sides in order to resist shot. For " this purpose I simply make the apparatus of stronger construc- " tion, and instead of using this hollow space as an access to the " ship's side, I fill or partially fill such enclosed space with the " metal protecting plates or other material, and I apply such " apparatus over the entire or any part of a ship's sides. If the " apparatus has sufficient displacement it will carry the weight of " the plates it contains, or it may be further lashed or bolted " through the top sides of the ship or otherwise secured thereto, " for this purpose a number of these apparatus are used placed " in close continuity through the length of the vessel or over as " much of her sides as it is desired to protect. Instead of " placing the shot-proof plates within the apparatus, the flexible " beams may be narrow without capacity and placed at distances " apart. In either case I provide grooves for slipping the plates " down in position, and which would only extend some little dis- " tance below the water line (about four or five feet) but may be " carried up to the bulwarks where the upper ends of the bend- " ing beams are secured, but which pass quite under the bottom " of the vessel, that is to say are in continuous length from side " to side of the ship as before described. The bending or flexible " apparatus may be made of gutta percha or thicknesses of india " cloth or other impervious material stiffened at short intervals " by narrow rigid supports so disposed as not to interfere with " the flexibility of the structure, while for the rigid apparatus " any suitable rigid impervious material may be employed. The " flexible apparatus, by reason of the flexibility being in the " direction of its length (round the bottom of the vessel) and other- " wise, accommodates itself to the shape of the bottom to which " it is compressed by the pressure of the water on its outside."

[Printed, 4*d*. No Drawings.]

A.D. 1865, January 14.—N° 118.

PAUL, Alfred, and PAUL, Edwin.—"A new or improved " hydraulic steering apparatus and rudder break." This invention "refers to or is connected with our Patent dated 28th " October 1864. It consists in the application of hydraulic " *principles to* the working of ship's rudders for steering purposes,

"and for steadying or locking the rudder. The object for which "it is to be applied is to lessen the friction and the wear and tear "which is experienced in ordinary steering gear, and moreover "to enable the man or men at the wheel to keep the rudder in "any required position without having to hold on to the steering "wheel. The mode of construction may be varied to suit parti-"cular circumstances or cases, the simplest and most generally "applicable mode being 'radial' which is as follows:—To the "tiller fitted to a ship's rudder head there are to be fitted or "forged, as the case may be, two round arms of any required "size, branching off one from either side of such tiller; the arms "are to be made a regular curve of any required radius, the centre "of such curve being the centre of the rudder head. There is "also to be a hollow curved cast-iron or other metallic chamber "corresponding in radius to the arms herein-before described. "Such chamber when furnished with proper stuffing boxes at the "ends, and with a suitable cock or valve, having also the afore-"said arms placed partially in it with their arc the reverse way of "the chamber is securely fixed to a foundation or sole plate and "bolted to the deck.

"The hollow chamber will be in two or more compartments "communicating with each other by means of internal passages. "The aforesaid cock or valve is to regulate the opening and "closing such passages. To act as a means of transmitting "motion to the rudder a suitable pump, either rotary or recipro-"cating, direct acting or multiplied, must be attached, having "passages corresponding to the passages in the hollow chambers."

The chamber and pump will be filled with water, oil, or any suitable liquid or fluid; then, with the cock or valve open, the rudder will be moved by pumping the liquid or fluid out of one compartment of the hollow chamber into the other. To lock the rudder, or to keep it in position, nothing is required but to move the cock or valve so as to close the communication between the compartments of the hollow chamber.

[Printed, 4*d*. No Drawings.]

A.D. 1865, January 16.—N° 137.

BETTELEY, Joseph.—"Improvements in ship building." "Heretofore in constructing what are commonly called or known "as 'composite' ships, or ships built with an iron frame and "planked with wood, iron beams have been used. Now, accord-

" ing to one part of my invention, the beams, instead of being of
" iron as heretofore are to be of wood, and to be connected with
" the iron framing by means of metal gusset plates rivetted or
" bolted to such framing; and according to another part of my
" invention, the lower parts of the vertical iron framing are to be
" connected with the timber flooring of such ships by means of
" metal gusset plates rivetted or bolted to the iron framing. For
" these purposes, in applying wood beams and connecting their
" ends with the angle-iron framing metal gusset, plates are em-
" ployed, which are rivetted to the angle-iron frames and are
" fastened to the ends of the wood beams by bolts passing from
" side to side of the wood beams and through the gusset plates.
" When the ribs or vertical framings are of double angle iron it
" is preferred that two gusset plates should be used, and that the
" width of the wood beams should be reduced at the ends, so that
" the ends may enter between the two side flanges of the double
" angle iron, or it may be two single angle irons, or the ends of
" the wood beams may be notched out to allow the said flanges to
" enter, in which case the gusset plates pass round outside of the
" angle-iron ribs or upright framings. When using T iron or
" ordinary angle iron, a single gusset plate is employed rivetted
" to the angle iron or to the stem of the T iron, and the central
" portion of the wood beam is cut away or notched out to receive
" the gusset plate in a central position, and the bolts are passed
" through the wood and through the gusset plate to fix the parts
" together. In addition to the gusset plates, in some cases I use
" fore and aft stringers or shelves fixed under the ends of the
" wood beams. In connecting the floor timbers and the vertical iron
" ribs or framing similar gusset plates are used, which are rivetted
" to the angle-iron framing and bolted to the ends of the floor
" timbers, by which those parts of a ship where the two systems of
" construction come together are made more secure and capable
" of enduring strains."

[Printed, 8*d*. Drawing.]

A.D. 1865, January 26.—N° 225.

HARRISON, John. — " Improvements in cleansing ships'
" bottoms at sea, and in the machinery, apparatus, or means
" connected therewith." The invention " relates to the arrange-
" ment and construction of machinery employed for cleansing

" the bottoms of ships or vessels when at sea, and it essentially " consists of a knife or scraper fixed to the end of a cranked or " straight rod or bar, and moveable in a frame, which frame is " held close against the ship's bottom by guide ropes which pass " from one side of the ship below the keel and up to the other " side. The framework carrying the scraper is moveable on the " guide ropes, and is furnished with anti-friction sheaves, so that " it may be the more easily moved. On the side of the ship " opposite to that being scraped a guide apparatus is placed " which bears against the keel; by this apparatus the guide ropes " are kept at the required distance apart, and the outer or " working rope is also kept from rubbing against the keel. " When the apparatus is employed for cleansing a ship's bottom " it is placed in the water and passed between the guide ropes " and the ship. A man or men, or winding apparatus, situated " at the side of the ship opposite to that being scraped hauls (or " haul) the scraper down to the keel; when in this position if the " rope attached to the scraper be hauled, the scraper by the " peculiarity of its formation acts across the plates of the hull, " cleansing them in its course."

[Printed, 10*d*. Drawing.]

A.D. 1865, February 1.—N° 286.

HUGHES, John.—" Improvements in the construction of " armour-plated ships, forts, and other like structures." This invention relates to the construction of ships of war, and consists in strengthening them with hollow stringers or girders running longitudinally, vertically, or otherwise. These stringers are rivetted to the skin and frames of the vessel, and form the backing for the armour plates. The spaces between the stringers, and also the hollow in the stringers, may be filled with wood or any composition that may be found suitable. The armour plates may or may not be in contact with the faces of the stringers.

The invention applies also to forts, turrets, cupolas, and other structures to be protected by armour plating.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1865, February 2.—N° 292.

LUNGLEY, Charles. — " Improvements in armour-plated " *ships, forts,* gun carriages, and works of defence, and in

" fastenings to be employed therein." "I use as backing to the " protecting plating bars of iron, which may be rolled or forged " of dimensions sufficient to be punched or drilled through for " fastening with bolts to the frame or backing of the ships, forts, " or other structures." The spaces between the bars "may then " be filled in with wood or such other suitable substance for ships " or forts as may be found desirable, and in the case of forts I " make the frames and stays of this or similar description of bars " so as to be strong enough to admit much larger fastenings than " heretofore. The object of this plan is to enable the fastenings " to be equal to the thickness and strength of the protecting " armour plates," which is effected by the support which the edges of the bars give to the armour plate in the vicinity of the holes, and by the firm hold which they take of the bolts. "The " connection in this manner will enable the bars to be fastened " edgeways, although they may be wider or deeper, and they " may also be rolled or forged thicker where fastenings go " through them, so that they may be drilled if thought advisable. " I also make the bars in two or more parts, so that they may be " secured together by rivets or bolts, clasping studs or fastenings " in ships or forts. The iron may be rolled thinner in the middle " so as to make it as light as possible; this iron I propose to " apply to strengthening such parts of the fortifications as may " require it, such as diagonal, vertical, or longitudinal ribs and " stays, and also to gun carriages."

" My fastenings are in the form of bolts, which I make hollow " with a conical part at the head or outer end, the inner end in " one case I upset by opening out so as to form a conical part in the " inside, and clinch it over;" "and also in some cases I form a " screw with a fine thread in the bolt and double nuts. In other " cases I slot out" a "keyhole with a long slot, so that in the " driving in with a shot or otherwise the key shall not be started " in with the bolt; in this case I have means of keeping the key " from dropping down by a shoulder and otherwise. In the cases " of forts I put the bolts through and clinch in the same way as " the shorter ones in ships. In some cases I put an inner bolt " to fit the cone of the outer one, and then fasten such inner one " with the same means as the outer one, care being taken that " the head is kept inside the outer one."

[Printed, 10*d*. Drawing.]

A.D. 1865, February 2.—N° 296.

JEFFREYS, Julius Saunders. — (*Provisional protection only.*) —" Improvements in armour-plated and other ships or vessels, " also applicable to fortifications generally." The invention consists " in constructing armour-plated vessels by placing a number " of tubes, of sufficient diameter that projectiles can pass through " them, across the vessel, such tubes being made trumpet- " mouthed so as to open out at either side of the vessel. The " surface of the vessel intervening between the openings of two " such tubes is by this means formed convex, so that a projectile " on striking such convex part will glance off and pass into one " of the said tubes. The tubes and convex surfaces may either " be formed rounded or angular. The tubes passing through the " vessel may conveniently form the deck beams, and by forming " communications between the interior of such tubes and the " interior of the vessel they may also serve for the purpose of " ventilation.

" The trumpet-mouthed openings of the tubes, as also the " intervening convex surfaces, are made of sufficient strength to " be shot-proof, either by forming the trumpet-mouthed and " convex surface of one plate, or by making them of separate " plates. By tying all the tubes passing through the vessel " rigidly together the vessel may be made of such strength as to " be applicable as a ram.

" The same construction of trumpet-mouthed tubes and inter- " vening convex surfaces may also be employed for fortifications " generally. The projectiles passing into such tubes may be con- " ducted into shot-proof spaces in connection therewith, such " tubes passing through the sides of the vessel, arranged either " transversely or longitudinally, may be employed simply for " purposes of ventilation, irrespective of armour-plating, for men- " of-war or for merchant vessels, and the openings of the tubes, " both in this case and in the before-described application, may " be provided with slides or sluice valves so that they may be " closed in heavy weather."

[Printed, 4*d*. No Drawings.]

A.D. 1865, February 4.—N° 315.

BROOMAN, Richard Archibald. — (*A communication from Adolphe Guibert.*)—" An improved varnish for preserving wood

" and for protecting iron ships and other metal work from oxy-" dation and from fouling." "This varnish is intended to pro-" tect wood from worms when placed in the ground, and from " marine plants and shell-fish in water; it also preserves metals " from oxydation, and iron ships and structures from fouling " under water."

It consists of 25 parts by weight of galipot, 25 parts of common resin, and 50 parts of essence of turpentine. To eighty parts of this mixture add 18 parts of sulphate of copper, reduced to an impalpable powder, and two parts of regulus of antimony, also in the state of impalpable powder.

" I sometimes substitute for the turpentine petroleum, benzine, " or other mineral and vegetable oils."

[Printed, 4*d*. No Drawings.]

A.D. 1865, February 6.—N° 321.

MARKHAM, Clements Robert. — (*A communication from William Graham McIvor.*) — " A new method for removing or " destroying the momentum of heavy bodies by means of an " elastic machine or machines, so as to prevent injury and " damage from concussion, applicable to ship cables, ship and " fort armour, railway trains, tenders to pier heads and floating " piers, gangways, breakwaters, and other similar structures, " also as a motive power." The method of construction and application to ships' cables is by means of a cylinder or drum revolving on a fixed axle, and containing a number of coiled springs in the interior. "These springs (secured at one end to " the axle and at the other to the cylinder) are formed like the " spring of a clock, and act against the cable stoppers (of chains, " ropes, belts of wire, or other material), which are wound round " the cylinder. Therefore as the cables are dragged forwards " over the bow by the force of the sea and wind, causing the " ship to recede, the cylinder revolves and winds up the springs " on the fixed axle; as the force of the wave passes the " springs re-act or unwind themselves, and rewind the cable " stoppers on the cylinder, thus producing a perfectly elastic " bearing of great simplicity and enormous strength."

A cylinder, six feet in length and four feet in diameter, inside measure, is calculated to exert a force of about seven hundred

and fifty hundredweight, if the cable stoppers are used on the circumference of the cylinder, or of one thousand five hundred hundredweight, if applied in grooves or on a reduced diameter of the cylinder. Any amount of elasticity and of power can easily be secured by increasing the diameter and length of the cylinder and reducing the diameter of the grooves in which the cable stoppers work. Instead, however, of greatly increasing the length of the cylinder it will be found more convenient to secure the coiled springs in a fixed box or frame-work, with a revolving axle, having the cable stoppers to work in a flanged wheel or wheels fixed on the axle at the ends, centre, or otherwise, as may be convenient, introducing, when necessary, thin diaphragms between each spring, and giving to the axle, in combination with these or separately, as many bearings as may be necessary, one especially being introduced on each side of the flanged wheel or wheels.

By a modification the work of the windlass or capstan could be performed by the cylinder, while an additional advantage would be obtained by this arrangement, as the handspike wheel would enable the bearings of the springs to be regulated to any desired strength by winding them up more or less against the cable stoppers, according as the storm increased.

The invention is also applied to secure elasticity to gangways attached to pier heads, so that ships may be moored and secured to the gangway, and be able to ship or unship cargoes in safety in open roadsteads, or where there is a heavy swell.

" I make the gangways of two main parts, sliding one upon " the other, and capable of elongating or contracting to meet the " requirements of a ship heaving and pitching in a rough sea. " The beams of the gangway are made to slide on each other in " a telescopic manner, or somewhat like the slides of an extend- " ing dining table, the platform being so disposed that the one " part slides over the other when it collapses or contracts. Fric- " tion rollers are provided to facilitate the sliding of one part on " the other, there is also a small inclined and hinged flap that " continues the surface of the platform from one part to the " other. The spring barrels are applied so as to give a permanent " tendency to contract the length of the platform, they are " disposed at each side of the gangway on a widened gangway " head of a semicircular form; this is mounted on a central pin

"fixed in the pier head on which the gangway is free to oscillate "in a horizontal direction. The gangway head is hinged to the "first part of the gangway so as to permit of a vertical oscil-"lating motion, while the telescopic arrangement of the second "part therewith permits of the lengthening or shortening of the "gangway when attached to the vessel, thus allowing of motion "in every direction."

The armour plating of a ship should not touch the walls of the ship, but should be made in sufficient lengths to reach from the upper deck to any desired distance below the water line, the breadth of each plate being about two feet, and supported on a loop joint at the bottom, so that on going into action the whole of the armour plates could be projected forward in an instant, and admit the water between the plating of the walls of the ship, the stratum of water thus admitted being about four feet thick at the water line. By this arrangement and supporting the upper ends of the plates on a lever projecting from a powerful spring cylinder, all concussion and vibration would be effectually removed from the ship. A further protection might be given to the machinery of vessels by constructing the water tanks in cells, and placing them amidships along the side of the outer walls. This system of water tanks should be formed in small compartments, and constructed to fit the walls of the vessel water-tight, so that on the walls and one or two of the cells being penetrated by balls, the outer water would be unable to pass into the interior of the ship. These cells, filled with water, from six to nine feet broad would present an impassable barrier to balls, from the fact that water is incompressible and offers a very serious resistance to the penetration of a projectile.

"In constructing the walls of a ship the ends of the beams only "should be exposed in the direction of the shot; these walls "being built of beams one foot square, or any other convenient "size fitted close, and bound together by horizontal and perpen-"dicular bands, of iron one or two inches deep, and from twelve "to twenty-four inches wide, introduced between each beam, and "at a distance of two or three feet apart along its entire length. "The walls of a ship thus constructed, and from six to fifteen feet "in thickness, would offer an impenetrable barrier to any pro-"jectile now in use, and probably to any which may be invented."

"In order to guard against the effects of red-hot shot, the wood

" should be rendered incombustible by being impregnated with
" pearlash or other similar material; but even without this im-
" pregnation there would be little danger from red-hot shot, from
" the fact that the fibre of the wood contracting immediately on
" the passage of the ball and filling up the entrance would pre-
" vent the ingress of oxygen to support combustion. Shells
" thrown into the walls and there exploded, would be discharged
" as from the mouth of a gun through the hole by which they
" entered, because all explosive materials escape at the point of
" least resistance."

Great difficulty being experienced on board-ship in discharging guns at a true horizontal line, or at any required elevation, an arrangement is given for firing them by electricity. By this arrangement the entire broadside could be thrown instantly and with unerring precision upon any one point of the enemy's ship.
" Under the system hitherto adopted in training guns it is im-
" possible that a broadside can be instantaneously discharged on
" account of the concussion and recoil, which places the ship in
" danger. To overcome this as well as to avoid great labor, and
" remove the delay which at present attends training heavy ordn-
" ance, it is necessary that the guns shall recoil against an elastic
" cylinder placed on the opposite side of the ship, the ropes or
" bands being conducted from the cylinder to the gun," "rollers
" for the ropes or bands being placed near the wall of the ship
" above the gun. Thus the drag of the rope or bands on the
" cylinder by the recoil of the guns would raise the opposite side
" the ship and depress that on which the guns were discharged,
" compensating for the reduction in weight near the side by the
" guns recoiling towards the ships' centre; also the springs by
" their reaction would almost instantaneously throw the guns
" back to the spot where they are to be reloaded or to a convenient
" distance from the ships' walls, and immediately restore the
" equilibrium. By this arrangement it is anticipated that the
" instantaneous discharge of the whole broadside would not cause
" the ship to sway more than a few inches, while all concussion
" and vibration would be removed by the guns recoiling with the
" utmost freedom against a perfectly elastic bearing. It will be
" understood that by adjusting the rollers (over which the ropes
" or bands pass) to any given angle the guns will be pointed to
" the same angle by the reaction of the springs, and the labour
" of training the guns can be dispensed with."

The inventor also describes a plan of self-acting portholes, that is, portholes to be opened by an electric discharge on the pendulum arm coming in contact with the battery points; the portholes will thus invariably be opened a second or two prior to the ship gaining the true level; when it reaches this point the guns would be discharged by the conductor coming in contact with the battery, the recoil of the guns closing the portholes by means of levers.

Floating piers, harbours, and breakwaters with elastic moorings also offer great advantages over anything hitherto attempted. These breakwaters and piers, especially such as have to stand in open roadsteads, should be constructed to give motion at short distances, fifteen or twenty feet along their entire length, so as to rise and fall with the waves. This motion would be secured by connecting the beams by two iron shoulders fastened by a powerful loop joint, and embracing the end of the beams. The loop joint would give motion in every direction, and be less liable to wear than any other form.

[Printed 2s. 8d. Drawings.]

A.D. 1865, February 7.—N° 337.

BRASSENS, RAYMOND, and LE MAT, FRANÇOIS ALEXANDRE.—(*Provisional protection only.*)—"Improvements in ships and "vessels." This invention consists "in constructing the after "part of ships and vessels as hereafter described; also in con"structing ships and vessels with three keels; whereby great "stability is ensured."

"The after part of the ships is constructed to receive two stern "posts, each of which is provided with a screw propeller, and "carries a rudder worked by one tiller. The central keel extends "from the bow and runs aft parallel with the other two keels, "which extend from the stern to the two stern posts, and the "central keel terminates in the tunnel or arch formed between the "two stern posts."

[Printed, 4d. No Drawings.]

A.D. 1865, February 9.—N° 363.

HALKETT, JOHN CORNELIUS CRAIGIE.—"Improvements in "protecting wooden surfaces from the fouling and injury to "which they are ordinarily liable in sea water." The invention has for its object to protect from the fouling and injury to which

they are ordinarily liable, any wooden surfaces which are immersed or partially immersed in sea water, such, for example, as the bottoms of wooden vessels, wooden piers, breakwaters, piles, and buoys. It consists in applying to the wooden surfaces to be protected a covering or sheathing of sheet iron or steel, such sheet iron or steel being itself coated on both sides. The coating on the inner side of the sheathing may be of a kind calculated to preserve it from corrosion merely, such, for example, as white oxide of lead made into a paint with boiled oil and litharge, or an oleaginous, fatty, or bituminous anti-corrosive mixture. The outer side of the sheathing must be coated with a mixture which, whilst it is anti-corrosive, is also anti-fouling; and for this purpose it is preferred to use the mixture described in the Specification of Letters Patent granted to Francis Cruickshank, and dated 4th August 1864 (No. 1941). Care must be taken to apply the outer anti-fouling coating to the edges of the sheets forming the metallic sheathing, and to the nails or other fastenings by which they are fixed on the wooden surfaces to be protected. If preferred, the anti-fouling and anti-corrosive coating may also be applied to the inner side of the sheathing, instead of the simple anti-corrosive coating.

[Printed, 4*d*. No Drawings.]

A.D. 1865, February 11.—N° 387.

ATHERTON, Charles, and RENTON, Amherst Hawker.—" Improvements in buoys, beacons, floats, or pontoons, which " improvements are also applicable to floating bodies generally." " Our improvements have for their object the construction of " buoys, beacons, floats or pontoons, and floating bodies gene- " rally in such manner that they shall be rendered permanently " buoyant or unsinkable however damaged by any casualty; and " this we effect by using in their construction a quantity of " suitable composite material or substance the mean specific " gravity of which shall be less than that of water. The compo- " site material which we prefer to use is a mixture of cork or " other light bark, light woods, or other natural or artificial " substances of small specific gravity suitably prepared for " intimate incorporation with bituminous, resinous, oleaginous, " or such other adhesive matter which when combined therewith " shall form a mass impermeable to water, and of a mean " specific gravity less than water, and such that when placed in

" the interior of the floating body shall cause it (howsoever per-" forated or damaged by collision or otherwise) to preserve its " buoyancy under the casualties to which floating bodies are " subject at sea."

" It may sometimes be found convenient to apply the material " in the form of hollow blocks or boxes, and to coat them with " bituminous or other adhesive waterproof and insoluble cement " or matter previously to their being applied to the structure, and " then finally grouted in place with melted bitumen or other " cement so as to form an united mass."

" In the application of the buoyant material to ships and " structures liable to accident from fire, it would be desirable to " prepare the whole of the materials in such manner as would " render them uninflammable, and this may be cheaply and " efficaciously done by impregnating them with any of the well-" known preparations, such as sulphate of ammonia, tungstate " of ammonia, and other salts either separately or combined." " In large structures, such as ships, it will be desirable to render " the continuity of the buoyant mass both longitudinally and " transversely as perfect as possible, for which purpose laths " of wood or iron may be laid in alternate courses so as to bond " together the entire mass."

" We propose to construct the hold of the ship, whether for " war or mercantile purposes, in such manner that in case of " fire occurring to the coals or cargo therein contained, the whole " or any portion of the said hold may be flooded up to the logged " line without endangering the safety of the vessel from founder-" ing. This may be effected by constructing the hull with " longitudinal bulkheads connected with the stem and stern " posts of the ship and transverse bulkheads introduced," " by " which arrangements the strength of the ship longitudinally " and transversely will be secured."

" In armour-plated vessels it has been found necessary to " increase the size of the ships so protected for the especial " purpose of carrying the additional weight for protecting the " armament and crew, but should such vessels be perforated " by shot or shell simultaneously in several parts so as to admit " the sea water into the ship an imminent danger of foundering " is manifestly incurred. Such a contingency is provided for by " this invention, the buoyant material preoccupies the ship,

" the hold may be flooded, but the ship cannot sink below her " logged line, leaving the crew and armament still effective."

[Printed 8d. Drawing.]

A.D. 1865, February 15.—No. 433.

LUNGLEY, CHARLES.—" Improvements in ventilating blinds " or screens, and in means of ventilating ships and vessels." " My invention consists in constructing blinds or screens with " alternate fixed and movable laths or battens, or with part of " the battens fixed and part movable."

" I construct the battens of such shapes that when entirely " open the air shall not have direct access through the screen, " while the air admitted may be regulated by causing the movable " battens to move or slide and more or less close the apertures " between the battens."

" For ventilating ships, I fit ventilators at the bottom of cabins " in the form of a trunk or pipe with openings therein, and fed " by air made in some cases to pass in tubes through refrigerators " or tanks made to communicate by pipes with the sea or external " water, so as to allow of circulation therein of water from the " sea, or in cases of paddle-wheel boats through a refrigerator " placed in the paddle-box, or a place near thereto. In some " cases I employ a pump or fan to drive the air through the " refrigerating tubes."

[Printed, 1*s*. 8*d*. Drawings.]

A.D. 1865, February 15.—N° 438.

BOUSFIELD, GEORGE TOMLINSON.—(*A communication from Charles Otis Holyoke.*)—" Improvements in the construction of " armour-plated ships." The invention consists of " metallic " beams or bars of arched form in cross section, firmly bolted or " otherwise secured to the face of the structure, and securely con- " nected with one another to guard against their lateral displace- " ment, and placed so near to each other as to oppose the entrance " of a projectile in the space between them. I thus avoid the " ordinary mistake of placing the material of equal thickness " over the whole structure, and mass my material in such a way " that a much larger portion of it is opposed to a blow than in " the ordinary system; besides which the arching of the beam

" serves to greatly strengthen it, putting all the material in a state
" of compression under a blow, besides diffusing the force of the
" blow over a very much larger surface than does the ordinary
" plating, and consequently over a correspondingly large amount
" of the backing; thus the strength and weight of a much larger
" and better disposed mass of materials is opposed to any blow
" than in the ordinary system of armour, consequently a much
" less weight of material in the aggregate is required to suc-
" cessfully oppose a given blow than in the ordinary system."

The invention also consists " in constructing the backing of an
" arched form, whereby its strength, stiffness, and consequent
" resistance to the crushing effect of a blow are immensely
" increased, and which serves, moreover, to diffuse the weight of
" the blow and convey or direct it against the mass of decks,
" floors, or partitions of the structure against which the backing
" takes its bearing, thus requiring a much less weight of backing
" for opposing a given blow than in the ordinary system."

And the invention further consists " in facing the metallic
" plating with wood arched in 'cross laminations' (that is, with
" the fibres of each layer placed at an angle with those of the
" adjoining layers), which is again faced and built up level with
" wood laid flatwise and 'cross laminated;' which facing serves
" to resist and 'cushion' the projectile and diminish the force of
" the blow upon the metallic plating."

The arched beams are secured to the vessel by heavy bolts, which pass through the side of the vessel; these bolts have elongated button-shaped heads, with an increased thickness of the bolt just under its head. The bolts, being first inserted with their heads parallel to the arched beams, are turned quarter way round, so as to cause the bolt heads to enter the notches or slots cut for them. They are then tightened by screw nuts. In the drawings, the inner arch has its abutments at the decks, so that its span is the height between decks. The outer arches are about one-third of this breadth.

A modification of the plan is described, in which domes of an arched form in cross sections, similar to the beams, are employed; these domes may be round or polygonal in plan, or of any suitable form, and are secured against lateral displacement by tie plates, and to the side of the vessel by heavy bolts, as described for the arched beams, and the whole is then covered in a similar manner with cross laminated wood facing, the tie plates being

provided with shoulders, and bolted to the side of the vessel or structure. If preferred, the arched facing may be composed of layers of cross-laminated wood, alternating with layers of iron or any tough material, such as dry raw hide; or dry raw hide, or other tough material may be substituted entirely for the cross-laminated wood. The arched beams also may be of variously modified construction, as either simply rolled to shape directly from the bloom, or rolled or hammered from a pile made of cross-laminated iron, or built up of plates, cross laminated or not, and bolted together, or may be built in any other suitable manner; the beams may be also additionally strengthened by a plate bolted or welded to the feet of the arch. On a projectile striking the armour, the cross-laminated wooden facing serves to resist and cushion the force of the projectile, thus lessening the severity of the blow on the arched beam, which, by means of its arched form, diffuses the force of the blow over a space corresponding to the width of the beam; it is then received by the arched backing, and in like manner is again diffused and conveyed against the sides of the decks, which constitute the chief support of the sides of the vessel.

[Printed, 2*s*. Drawings.]

A.D. 1865, February 17.—N° 455.

BROWN, JOHN.—" Improvements in armour plates for vessels " of war and for other similar purposes." This invention consists " in deeply grooving the outer face of iron plates or armour " slabs which generally constitute the exterior side of the " ordinary iron casing of vessels of war and armoured fortifica- " tions, so as to form longitudinal ridges, taking care however " that they shall run in a horizontal direction where the plate is " fixed in its place. The salient angle formed by the lateral " planes of the ridges should measure 90 degrees or thereabouts, " that is to say the angle which will enable the most power to be " absorbed from the shot with the least damage to the plate from " the diverging resultants of the force represented by the imping- " ing projectile. The bottom of the groove may be either angular " or plane, in either case it should receive one or more shallow " ridges, the lateral sides of which may form acute angles. The " opening and depth of the grooves should be such that projec- " *tiles of* large calibre when fired for the purpose of penetrating " *these plates* will be compelled to lodge in the grooves and

" therein take a plurality of surfaces of contact as well as crush
" in the shallow ridges, the object being on the part of the plates
" to increase the amount of work that the shot has to do at the
" first moment of penetration, and thereby facilitate the absorp-
" tion on the part of the armour, and the consumption on that
" of the projectile of the force of impact. The thickness of the
" plate must be sufficient to resist disruption, support the ridges,
" and defy the power left to the shot, after the special action
" exercised by the plurality of contact surfaces ceases through
" the projectile getting deeply immerged into the substance of
" the plate, from which moment the conditions of resistance to
" penetration become assimilated to those of the ordinary slabs
" now in general use for structures intended to be shot proof."

As a constituent part of the same invention, "the backing im-
" mediately to the rear of the grooves and in contact with the
" plate is transformed into a powerful element of strength by the
" introduction of metallic troughs (iron or steel) running hori-
" zontally, the open side pressing against the plate while the
" wedge-shaped rear is turned towards the skin or frame of the
" structure. This peculiar arrangement enables me again to bring
" into play the principle of a plurality of contact surfaces, because
" if the shot pierces the plate at the grooves it will lodge in both
" the supporting sides; it moreover assists in stiffening the struc-
" ture at the moment when the flexure caused by the blow tends
" to open the whole and disjoin the various parts of which it is
" constituted, and lastly, it has the great advantage of circum-
" scribing the damaging effect of live shells, because the explo-
" sive charge could not hereby act beyond the space enclosed by
" the lateral iron sides. These 'troughs' are intended to be filled
" with timber."

Also as a constituent part of the same invention, "I place in
" the rear of these iron 'troughs,' and consequently in the rear
" likewise of the grooves within which the projectile is compelled
" to force its passage, a horizontal iron framework of great
" solidity and elasticity to support the former to enliven the
" resistance by developing a powerful amount of 'reactive force'
" and to disperse over the structure the concussion produced by
" the blow. This framework is composed of T iron, the vertical
" branch being prolonged about an inch or two on the opposite
" side with the object of forming a small ridge for the small
" trough to rest upon while the lower vertical arm runs between

" a double row of angle irons, rivetted or otherwise fixed to the " iron skin. To every groove of the plate's face corresponds one " of these horizontal constructions, the top branch of the T-iron " being midway or thereabouts between the rear face of the " armour and the skin. Lastly, to connect the plate with the " skin and with the horizontal frames I make use of a second " skin Λ-shaped, the salient edge of which supports the plates, " receives the through bolts and corresponds to the salient of the " plate while the lower ends rest on the T-iron plates of the " outer frame. Thus commencing at the skin, I rivet, bolt, or " otherwise fix to it as many horizontal double rows of angle " irons as there are salients in the outer face of the armour plates. " I then fill up the space between these rows with timber, oak or " teak, or any suitable wood exceeding the ridges of the angle " irons by about 2 inches. I then fix the T-irons in their proper " position, drawing them as closely as possible to the skin of the " arm, vertical in this figure T, but horizontal in the structure, " sliding tightly in the groove left between the two corresponding " angle irons. It will however be useful to avoid bringing the " upper plate of the T on to the extreme foremost lines of the " angle irons, and likewise avoid resting the extreme end of the " vertical arm (horizontal in the structure) against any harder " substance than wood, because the immediate contact of hard " metals across the direction which penetration must necessarily " take is detrimental to the distribution of the shock over a maxi- " mum area as well as to the gradual extension of vibration from " the exterior to the interior. By properly attending to this con- " struction 'frame cushions' of great strength and elasticity are " thereby ensured to the backing. The Λ timber is there put on " followed by the Λ-shaped skin, the latter firmly fixed to the " upper plates of the T-irons. A system of large 'troughs' is " thus formed, the sides of which are most useful in dispersing " the concussion over a great area. These 'troughs' have then " to be filled up with suitable timber, and the 'small troughs' " inserted one for every corresponding groove of the armour " plates for the reception of which the structure is now ready. " On a shot striking it would have to take a plurality of contact " surfaces in the grooves, crush down the shallow ridges, pierce " the slab, lodge between the two sides of the small troughs, " overcome their resistance, take a plurality of contact surfaces " with respect to the Λ skin, and then break through the outer

" frames or rows of horizontal 'frame cushions' before it could " come into contact with the skin."

[Printed, 10*d*. Drawing.]

A.D. 1865, February 23.—N° 509.

HASELTINE, GEORGE.—(*A communication from Augustus Walker.*)—" Improvements in ships of war, partly applicable to " ships designed for the merchant service." The invention relates, first, to a peculiar form of ships' bottoms, and consists in forming the bottoms of war and other ships with a concavity on either side of a central keel, outside of which concavities is a straight and nearly horizontal surface.

" The peculiar form of the double concave bottom consists in its " commencing at the top of a central keel extending upward and " outboard," describing an arc of some 90°, where it connects with a flat bottom (with little dead rise), which flat bottom connects with the second futtock forming the bilge and the upright side; this constitutes the entire frame of the ship. " The concave " form extends the whole length of the keel fore and aft, making " the entire bottom from the connection of the concave form to " the turn of the bilge a straight flat surface athwart ships, as " well as fore and aft, which differs from the common mode of " construction." " This form of double concave bottom is " adapted alike to ocean and inland navigation wherever there is " sufficient depth of water to permit the propeller wheel to work " freely below the dead flat of the bottom. It is equally well " adapted to vessels which rely entirely on their canvas to make " speedy voyages, the narrow portion of the bottom presenting " but little resistance while running off large or free before the " wind, and when close hauled no form of bottom can ply faster " to windward." It presents " a more natural set of water lines, " both forward and aft, than the common model, the angles being " less abrupt, the result of which is a greater increase of speed, " the most important result being gained by having a sufficient " depth to the propeller, to allow nearly one-half the power to be " applied in solid water below the main displacement, giving great " advantage over the common mode of propulsion, where the " whole depth of displacement is in a line parallel with the lower " circumference of the wheel, causing the propeller to act in a " body of water disturbed by the vessel passing through it." It

"is peculiarly calculated to make the vessel answer her helm "more readily. All the water lines, from the keel upward to the "flat bottom, are nearly straight, giving a free passage to the "current throughout the entire length."

It consists, secondly, "in giving increased strength and firm- "ness to war and merchant ships by means of one or more frames "running lengthwise of the ship, preferably composed of two "arches in reversed positions united by truss work, each termi- "nating near the ends of the ship, in connection with one or "more similar frames running crosswise. These frames may be "used separately however when desired. By means of these "frames the greatest strength is given to ships by the least addi- "tion of weight."

Thirdly, "in giving strength and rigidity to an iron or steel "prow for war ships by means of horizontal and vertical arches. "An arch is also introduced when the ship is designed to be used "as a ram extending from the extreme bow longitudinally about "one-fourth the length of the ship. This arch forms a part of the "exterior of the prow, which may be supported on its interior in "any suitable manner."

Fourthly, "in protecting ships from shot and shell by means of "a metallic armour consisting of two straight layers of plate with "a corrugated plate between, the corrugations being completely "filled up with india-rubber, or other elastic or yielding material. "This mode of constructing an elastic armour obviates the chief "objections heretofore experienced in applying the same to the "protection of ships."

Fifthly, "in constructing shot-proof turrets, either revolving or "stationary, or part revolving and part stationary, the same being "supported upon or within a casing in the form of a circular "arch. Either the lower or upper part may be made to revolve "independently, and the parts constructed separately may be easily "connected at any time by means of screw bolts."

Sixthly, "in ventilating the turret and other parts of the ship "by means of curved tubes extending from either side of the ship "to the casing or to the lower part of the ship, air being admitted "to the turret through apertures formed on a level with the inner "ends of the tubes, which terminate in the casing. Tubes may "also be employed converging from other directions. I prefer- "ably make these tubes narrower at their outer ends and square

" and larger at their inner ends, to create a draft, and at the same " time to prevent the entrance of water."

The tubes incline upward from the outside, and under ordinary circumstances will in this way be protected from the entrance of water. The tubes by which the cabins and state rooms are ventilated may be closed by shot-proof caps, to exclude water and projectiles in rough weather or when in action. Sliding stanchions are also employed, which while the vessel is under way may project above the upper deck, but while in action are lowered down and thus constitute plugs which close the tubes.

Seventhly, "in employing one or more domed pilot houses for " a war ship, so constructed as to slide up and down in the deck " in any convenient manner, these turrets forming the only " entrance to the interior of the ship."

The deck is raised around the turrets to protect them, and every part of the ship presents a slanting surface to the shot and shell of the enemy.

[Printed, 1s. Drawings.]

A.D. 1865, March 1.—N° 578.

KOCHS, WILLIAM EDWARD.—"Improvements in the construc- " tion of beams or supports applicable to the building of bridges, " viaducts, roofs, arches, and ships, and in instruments to be used " therein." This invention relates to a novel mode of construction for securing strength and rigidity in wrought-iron and other beams, brackets, arches, and other supports, particularly for the building of bridges of large spans.

The invention may be said to consist in the use of skeleton triangles proportioned and disposed on a novel principle, which is applicable to several purposes, and among others to the longitudinal and transverse trussing of floating vessels.

The advantages claimed for it are, firstly, that wrought-iron beams or principals, for bridges and other structures, can be brought together in elementary bars or parts and fastened at their extremities by screw bolts and nuts, in place of the usual rivets, and their rigidity and strength secured.

Secondly, that bridges on the suspended and trussed principle and beams constructed as herein-after described, are in their parts self supporting, and require for their erection far less scaffolding than when the system of structures hitherto in use is applied, the

beams themselves serving, in their erection, the purpose of scaffolding.

Thirdly, by the novel disposition of material, a bridge constructed on either the suspended or trussed principle can be produced of larger span, and structures in general can be erected on a larger practical scale than hitherto, the necessary strength and firmness being obtained with the use of a proportionately less weight of material.

The principle of the invention, in its simplest form, consists in suspending or trussing beams at or from several equi-distant points on the beam, which trusses or supports all trend towards a certain point of suspension or support, as the case may be.

The inventor applies this principle to the construction of longitudinal and transverse beams, and ribs of ships or vessels in general, in the following manner:—" Longitudinally, through the " whole length of the vessel, a beam composed of two cantilevers " connected back to back at the centre (in the line of the mast) is " introduced. The same, thus combined with the vessel, forms a " strong back bone, and the beam having at the same time the " advantage of resisting equally well a compressive as tensile " strain, will afford internal strength against hogging and sagging, " when the vessel is supported either by one or two waves; the " application of such beam is particularly adapted for long and " shallow vessels." A deep transverse rib similarly constructed forms the partition in the centre of the vessel.

The ordinary ribs of the vessel are also to be of this peculiar lattice formation.

[Printed, 3s. 10d. Drawings.]

A.D. 1865, March 6.—N° 624.

CRUICKSHANK, Francis.—" Improvements in coatings for " the prevention of the fouling to which iron and other ships and " structures are ordinarily liable in sea water."

The invention relates to " the prevention of the fouling to " which iron and other ships and structures are" " liable in sea " water, and it consists in employing for that purpose cyanide of " mercury made up or incorporated with a suitable medium " to form a coating or paint to be applied to the surface to be " protected.

" The medium with which the cyanide of mercury is incorporated " may be varied, provided that it is of a resinous, bituminous,

" oleaginous, fatty, or saponaceous character. As an example I " may state that a good medium may be formed by combining " gutta percha and rosin with gas tar. The proportions of the " ingredients may be varied, but the quantity of the coating to " cover a square yard of the surface to be protected should contain " from one to three ounces of the cyanide of mercury."

[Printed, 4*d*. No Drawings.]

A.D. 1865, March 10.—N° 681.

ROBERTS, Richard Percy.—(*Provisional protection only.*)— " Improvements in coating the bottoms of iron ships and other " surfaces to prevent oxidation, the adhesion of marine animals " and plants, and in compositions to be therein employed." " In " coating the bottom of an iron ship the surface should be in the " first place scraped and cleaned, then muriate of ammonia or " other salt or compound of ammonia is applied, or, in place " thereof, water which has been acidulated by mixing with it the " farina of rye or other grain and fermenting the mixture; or " water impregnated with carbonic acid gas or acidulated water " or other solvent may be employed. The surface being thus pre- " pared it is coated with a varnish consisting of shellac and copal, " or other gum or similar material, dissolved in methylated or " other spirit or solvent, and mixed with nitrate of mercury or " other salt of mercury, which can be held in solution in the " spirit or solvent, and which the sea water will act upon or " decompose.

" I prefer to employ the following composition, say :—2 lbs. " shellac, ¼ lb. copal, ½ lb. nitrate of mercury, 1 gallon methylated " spirit."

" In place of preparing the ship's bottom as above described, " it may be painted or varnished and the composition applied " over the paint or varnish, or other methods of preparation may " be resorted to.

" Compositions such as that above described may be used " for coating other surfaces, whether submerged or otherwise."

[Printed, 4*d*. No Drawings.]

A.D. 1865, March 21.—N° 783.

GREENE, William Vincent.—(*Provisional protection refused.*) —" Improvements in vessels of war and in ordnance." The im-

provements in vessels of war consist in so constructing the same as to render practicable the use of ordnance of a greater size and power than any heretofore used.

" One plan of effecting this object is as follows :—The hull of " the vessel to be employed for this purpose is to be made of two " or more distinctive and independent parts, the lower portion " thereof constituting a floating carriage or platform for the guns " of great size and power. The upper or outer portion of the " ship, which is to have a separate bottom, and by preference flat, " is to be so constructed as to contain accommodation for the com- " mander, the officers, and crew, as also propulsion, stores, etc. " I prefer propelling by two screws, and steering by two rudders. " The gun having been loaded and pointed, the gunners may " retire from the lower portion, carriage, or platform, to the upper " or outer portion of the ship, and the gun be discharged there- " from. The carriage of the gun therefore being separate from " the upper or outer portion of the ship will take the whole force " of the recoil, which in turn will be absorbed by the external " water in which it floats." The ship is to be covered with a stout deck or decks, and the internal partitions or sides separating the ship from the carriage, is to be sufficiently stout and well padded to deaden the noise. " As the force of the recoil will " tend to push the carriage backwards and downwards, the said " carriage is to be so constructed as to be free to slide in the " direction of the length of the ship, and elastic bands or other " suitable arrangements are to be provided for bringing the " carriage to its proper position for another charge. When the " ship is not in action the carriage or platform may be bolted or " otherwise fastened to the outer portion of the ship. The " carriage or platform may be made of two or more parts sliding " or moving one within the other, the trunnion bearings having, " by preference, a spherical base, so as to form a ball-and-socket " joint. It may also be provided with space for stowage."

According to another arrangement for effecting the herein-before mentioned objects the ship is to be provided with one or more tubes or passages running throughout its length, and open to the water, especially at the stern. The tube or passage is to be placed at such a depth that the greater portion thereof will be immersed in water while the ship is in action. In this tube or passage a gun of large size is to be placed, the breech end thereof being made spherical, or surrounded by discs, or embedded or fitted in

or on a carriage of such form and size as to offer after each discharge a sufficient resistance to its passage through the water, air, or other matter or fluid contained in the tube or channel. By this arrangement the force of the recoil will be absorbed by the water, air, or other matter or fluid in the tube without injury to the ship or inconvenience to those therein. Two guns may be used to each tube thus :—Two openings are to be provided at the top of the tube or passage, the gun having been loaded within the ship is lowered through the upper opening, when, by the force of the recoil after a discharge, it will be driven opposite, or near to the other opening, where it is to be raised by suitable tackle or apparatus provided for the purpose. While this is being done another gun may be loaded and lowered into the upper opening, and so on in constant succession. The tube or channel may be embedded in or surrounded by yielding materials, and in some cases the tube may be made of a telescopic form, so that while in action it may extend beyond the hull of the ship.

Another arrangement for working heavy ordnance is to suspend the same from the ship by suitable rods or tackle, the said gun or guns being made to float or partially float in or on the water when discharged. This object may be attained by constructing a twin ship or ships open to the water over a portion of their bottom, or by other equivalent means. The gun being suspended from the ship may be raised to any desired position for loading, and when lowered to the water may be pointed from the inside of the ship by means of suitable apparatus provided for that purpose. The guns to be employed for carrying out this part of the invention should be enclosed within a series of discs, or be otherwise so embedded or encased as to offer sufficient resistance to their passage through the water after a discharge, and also to receive a certain amount of buoyancy.

"Another arrangement consists in so constructing vessels of war "that the force of the recoil of the gun or guns to be used "therein shall be diffused evenly and equally over the whole or a "large portion of the hull of such ships. To effect this a series "of grooves or recesses of varying diameter are formed in the "hull of the ship, the said grooves or recesses being slightly "curved on their surfaces. A gun having a series of steel discs "or springs corresponding in number with the grooves in the "ship is then fitted therein, and will be free to move in any

" direction necessary for pointing or firing. In order to diffuse " the strain evenly over the whole spring, I prefer to make the " barrel of the gun taper towards the breech, or a strong collar " may be fitted on the part of the barrel where the spring ter- " minates, and elastic or other pads or collars be placed between " the discs.

"A similar object may be attained by embedding ordnance in " a casing or cushion of fibrous or other yielding matter, material " or materials, the gun being by preference of a spherical form " at the breech, so as to form a ball-and-socket joint, and permit " of the gun being moved in its bed or cushion in any direction " necessary for firing."

An improved mode of constructing large guns is also described.

[Printed, 4*d*. No Drawings.]

A.D. 1865, March 28.—N° 871.

HALKETT, JOHN CORNELIUS CRAIGIE.—"An improvement " in paints or compositions used for coating iron or wooden vessels " and other structures exposed to the action of sea water." The invention consists " principally in the employment of sulphate of " baryta, or of any other salt of baryta which is insoluble or almost " insoluble in sea water, either in combination with poisonous, " saponaceous, oleaginous, or resinous compounds, or with coal " tar, asphaltum, bituminous, or gummy substances, as a princi- " pal ingredient in such paints or compositions, the chief object of " such employment being to render such paints or compositions " more insoluble and less liable than hitherto to damage or " deterioration by exposure to the action of sea water. For " example, I take about three pounds of sulphate of baryta, one " pound of boiled linseed oil, and as an aid for drying (say) about " four ounces of copal varnish. This mixture I use as a 'vehicle' " for any of the known anti-fouling and anti-corrosive compounds, " employing (by preference) the poisonous compounds mentioned " in the Specification of the Patent granted to Francis Cruick- " shank, dated 4th August, 1864 (No. 1941), or that mentioned " in the Specification of the Patent granted to the said Francis " Cruickshank, dated 6th March, 1865 (No. 624).

[Printed, 4*d*. No Drawings.]

A.D. 1865, April 5.—N° 964.

BETHELL, JOHN.—" Improvements in building barges, ships, " and other vessels." " I select wood planks of the most porous " materials, such as beech or porous fir, and I force into them, " under very heavy pressure, as much as possible of the heavy oil " obtained by the distillation of gas tar; the pores of the wood " will thus become filled with a bituminous fluid which will in " time set into a solid." " Such wood will become perfectly " waterproof, will resist the attacks of all sea worms, and will not " be affected by dry rot.

" In building barges or ships, I use ribs of angle or T-iron, and " on the outside I first fasten one plank (prepared as above named) " by means of screw bolts and nuts; such plank may be either " 2 or 3 inches thick or any other thickness that may be desired. " Then over this plank I fasten, by means of copper or mixed " metal nails or screws, another thin plank, which may be 1 inch " or ¾ inch thick, prepared with the tar oil as above named; over " this thin plank copper sheathing can be placed, which will not " be touched by the iron bolts and not affected thereby. Or " instead of placing the planks in the manner above described I " place two creosoted planks of about 2 inches thick diagonally " one over the other, and pass the bolts above described through " both planks and through the iron ribs, and I then cover the " outside with another thin creosoted plank as above described, " to protect the heads of the iron bolts from corrosion, and over " this thin plank copper sheathing can be placed; but for barges " and some small ships I do not intend to use the copper sheath- " ing. Between these planks I place some marine glue which " cements the planks together, and which, with the aid of the " outer one-inch plank, prevents the heads of the bolts from being " moistened and rusted by sea water. The creosoted wood pre- " serves the iron bolts from corrosion, and the bituminous matter " consolidating by time acts as an asphalte or cement, and holds " them most firmly in their places. In some cases when a very " strong ship is not required I use merely a thick plank of wood, " prepared as above described, fastened on to the outside of the " iron ribs."

[Printed, 4d. No Drawings.]

A.D. 1865, April 5.—N° 970.

RITHERDON, EDWARD.—" Improvements in protecting iron " ships and other submerged structures from oxidation and corro-

"sion." The invention consists "in first securing harpings or "ribbons of wood by means of metal plates screwed, rivetted, or "otherwise fixed to the structure to be protected. I then screw "to the harpings, taking care that the screws shall not pass "entirely through them, planking, and that, by preference, in a "diagonal direction; I then caulk the planking and cover it with "felt and copper. The spaces between the metal plates and the "inside of the planking may be filled in with wood, cement, "cork, or other material or not at will."

[Printed, 1s. 4d. Drawings.]

A.D. 1865, April 7.—N° 995.

EDMONDS, Henry.—"Improvements in apparatus for lighting "and ventilating ships, part of which is also applicable for pro-"ducing fresh water at sea." The improvements consist, first, in constructing a tubular apparatus to extend around or partly around the sides of the mess or cabin decks of a ship, at as high a level as it can conveniently be placed. The diameter of the tube should be from 3 to 6 inches, according to the number of lights required to be used in connexion with it, about one square inch for each lamp. The lamps should be stationary beneath this tubular apparatus, each fixed in its place and provided with a chimney. "I prefer to use a square lanthorn to fit over the lamp, "having a metal chimney, the lanthorn to be three sides glazed "and one side reflecting. Above each lamp a small branch tube "about 1¼ inch in diameter should lead downwards from the side "tube already described to near the level of the top of the chim-"ney of the lamp, and it should be provided with a sliding con-"tinuation to fall and fit closely over it, thus establishing a "direct communication between the lamp or lighting medium "and the side tube, into which all the heat and vapours of the "lamps must pass; to carry these off the side tube or tubes must "be communicated into one or more updraft ventilators; these "may be any of the ordinary ventilators at present in use, as the "funnel, hollow iron masts, the galley funnel, or tube ventilators.

"Second, where tube ventilators are used to create the necessary "constant updraft, and to increase their ventilating action on the "between-decks, I insert a steam condensing vessel supplied by "a pipe with steam from a boiler into the lower part of the venti-"lator, having tubular or other air passage passing through it "occupying the greater part of its area. The steam surrounds

" these air passages, and the air being thus heated and rarefied " rises rapidly, and a constant up-current is created, and a larger " quantity of the foul air of the decks will also be drawn through " these air passages in the" condenser; this, together with the vapours of the lamps, will, by abstracting heat from the steam, condense it into fresh water, which flows out through a pipe at the bottom of the condenser.

"Third, the motion of the air through the heated air passages " for ventilation and for the increased condensation of steam may " be accelerated by the use of a fan or other air forcing means, " such as by directing a number of minute steam jets up the " ventilator, which I find the most effectual when acting above " the condenser.

" Fourth, for lighting in connection with my apparatus any " kind of lamp or lighting medium may be used, but I prefer to " use a hydrocarbon lamp, such as Hinks' Patent."

[Printed, 8*d*. Drawing.]

A.D. 1865, April 8.—N° 1008.

DAVIES, George.—(*A communication from William Bolivar Davis.*)—(*Provisional protection only.*)—" An improved composi- " tion for preventing the fouling of ships and other vessels." " This composition consists of arsenic, acetate of copper, acetate " of zinc, linseed oil, spirits of turpentine, or benzine, or other " equivalent substance, and the residuum of palm oil or tallow " after distillation." The substances are mixed in about the following proportions or parts, viz.:—Residuum of palm oil, 15; acetate of copper, 20; acetate of zinc, 10; arsenic, 20; spirits of turpentine, benzine, or equivalent substances, 25; linseed oil, 10.

" In order to coat any surface such as that of the bottom of a " vessel with the composition, that portion to be coated should " first be painted over with two coats of the residuum of palm oil " or tallow after distillation. This effectually prevents the water " from coming into contact with the metal, and consequently " precludes any galvanic action or oxidation. A coating of the " composition is then applied over the tallow or palm oil."

" It has been found that the palm oil or tallow acts as a per- " fect shield for the arsenic, and effectually prevents the water " from acting on it in any manner. The greater portion of the " arsenic, however, combines with the copper and zinc, forming a

" combination which is not only a very active poison, but is also " almost insoluble in water."

[Printed, 4*d*. No Drawings.]

A.D. 1865, April 18.—N° 1083.

BEDDER, WILLIAM.—" Improvements in the construction of " ships or vessels, or cars to float on water." This invention consists " in supporting a car or vessel above the water level on axles " or shafts passed through rotating hollow air-tight drums or " cylinders which are caused to revolve on their axles by steam or " other motive power. The car or vessel to carry passengers and " freight is supported by the axles or shafts of the drums or cylin- " ders which by their buoyancy keep the car or vessel suspended " above the level of the water. By communicating motion to the " drums or cylinders they will rotate on or through the water, " while the car or vessel is suspended above the water in a suffi- " cient degree to prevent the water offering any resistance to it, " and therefore comparatively but little power will be required to " propel the vessel along. The number of drums or cylinders, " their size, shape, and mode of construction, as well as that of " the car or vessel to which they are attached, will depend on the " requirements, skill, and taste of the naval architect or engineer. " If a large amount of carrying power is required, then instead " of putting two drums or cylinders to one shaft or axle, I should " place as many as may be deemed advisable."

" The advantages sought to be obtained by this invention are, " increased speed at a comparatively less expenditure of power " and fuel; greater safety from danger, such as shoals, mud or " sand banks, and sunken rocks; and by requiring so small " draught of water, to effect an immense saving in the cost of " constructing docks, deepening channels, and other water ways."

[Printed, 1*s*. Drawings.]

A.D. 1865, April 20.—N° 1107.

CAUDWELL, HENRY.—" Improvements in the construction of " ships of war and floating batteries, part of which improvements " are applicable to land fortifications." These improvements relate to the construction of the broadsides of vessels of war, and land or floating batteries, in such a manner as to deflect all projectiles that strike them, and to cause such projectiles to pass through

or into passages provided for the purpose, so that they may pass over, under, or through such passages without penetrating to the interior or habitable part of the vessel or fortification. By means of the peculiar construction of broadside, hereafter described, greater strength in vessels of war is insured, so that they will be enabled to resist the effects of side waves.

The hull of the vessel is constructed of wood to within six feet of the water-line, and the upper portion of the broadside is made of iron or steel. The gun deck is supported by a suitable number of vertical ribs or bulkheads, and between these ribs or bulkheads are formed funnel-shaped passages through the vessel, "with " inclined or curved sides, or with inclined and vertical sides. In " iron vessels these ribs or bulkheads are to be carried down to " the keel."

The ribs and partitions are supported or backed by wood framing, or by wood framing enclosing sand, clay, or other earthy or mineral substance. The upper or gun deck is provided with inclined bulwarks, and has a projecting lip running round the vesssel. At suitable distances wrought-iron corrugations are formed to enclose the guns. The projecting iron lip and the curved heads of the ribs or partitions may be insulated by the interposition, between the ribs and the armour-plated sides of the passages, of some insulating or non-conducting substance, such as algæite, india-rubber, or gutta percha. These parts may be rendered magnetic by means of an electro-magnetic machine of the ordinary or any other suitable construction placed within the vessel. Between the lower edge of the iron armour and the copper sheathing of the hull, a band of elastic non-conducting substance is attached to the side of the vessel, such as Ghislin's algæite before mentioned, or any compound of india-rubber and gutta percha.

The improvements in steering consist in carrying one or more paddle-wheels within the vessel, and at right angles thereto, situate by preference near the stem, These wheels are below the water-line, and are enclosed within a case, except their lower floats, which dip into a passage formed at right angles to the length of the vessel, and open at both sides. These paddle wheels are to be rotated in the direction desired by means of an engine in the ordinary manner. The vessel is to be propelled by means of a screw and paddle-wheels, driven by a combined engine.

The propelling paddle-wheels are placed on each side of the keel, and are enclosed in cases to prevent the entrance of water

into the vessel, the paddle wheels being altogether below the water line.

[Printed, 1s. 4d. Drawings.]

A.D. 1865, April 25.—N° 1157.

ELDER, William. — "Improvements in steering ships or "vessels, and in the machinery or apparatus connected there-"with." The invention has for its object the means of steering ships by machinery actuated by means of a piston working in a cylinder, which piston is moved, preferably, by steam, although water, compressed air, or other suitable medium for producing pressure may also be used. The cylinder is arranged upon a sole plate, which carries all the gear of the machine, and is arranged transversely on any convenient part of the ship, and the piston rod passes through both ends of the cylinder, to each end of which chains are attached, which pass over sheaves or pulleys situated at the extreme traverse of the rods, and their other ends being turned back to midships pass each other in separate grooves over the driving wheel, and are each made fast thereto. This driving wheel is mounted upon a short shaft lying at right angles to the cylinder, and which shaft is at about the middle of one side of the cylinder; close beside the driving wheel, on the same shaft, is fitted the break and steering wheel of larger diameter, which is furnished with three grooves, one of which is to contain the break strap, which can be tightened more or less, or released altogether at pleasure, instantaneously, by the slightest movement of the steersman's foot. The purpose of this break is to have a slipping or frictional command of the rudder in any weather. The other two grooves are for receiving the port and starboard chains, which are separately made fast thereto, the other ends being led off in the usual way to the compensating tiller on the rudder head or intermediate shaft, in such a manner that when the piston moves in the cylinder its motion is communicated to the rudder.

Another part of the invention consists in the mode or manner in which it is preferred to construct the compensating tiller. This compensating tiller is formed as a triangle on the one side of the rudder, to the head of which it is fastened, whilst the other side is constructed so that a tiller may be inserted therein for enabling the rudder to be actuated by hand if the steering gear should get defective or damaged. It is generally usual to fix the tiller chains

to the middle, but "I prefer to connect them at the outer points " of the base of the triangle, as already mentioned, by which I " effect a double leverage when the rudder is in that position in " which the greater amount of power is required to keep it in " the same."

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1865, April 25.—N° 1162.

HUSBAND, WILLIAM.—(*Provisional protection only.*)—" Im- " provements in securing or fastening wooden planking to iron " frames in ships or vessels and also to the outside of iron ships." This invention relates, firstly, to improved methods of securing or fastening wooden planking to the interior of iron frames of ships or vessels, whether such frames be in the form of angle iron, plate iron, or iron of any other form, the word planking to include every part of the external timber, and the keel, stem, and stern posts.

And, secondly, to securing or fastening wooden planking to the exterior of iron ships or vessels, in order to attach copper or other metallic sheathing to such wood, and thus prevent electrical action between the iron and the sheathing.

It has hitherto been the practice in fastening planking to the frames or ribs of vessels to form bolt holes through the planks, and to insert the bolts or screws from the exterior of the planks to the ribs or framing, so that contact occurs between the bolt head and the sheathing of the ship; but the invention consists in tapping on the interior side of the planking parallel screw threads extending to a sufficient depth to ensure a firm hold to the frames by the insertion of screws formed parallel throughout their length. By previously tapping the planking the parallel screws are readily inserted, and will give a much greater holding power. Taper screws may, however, be used, if desired, without tapping; but this plan is inferior in strength and holding power. Copper or metallic sheathing may thus be applied to a flush wooden surface, and consequently galvanic action will be prevented.

" I likewise propose to apply wooden planking to the hulls of " iron vessels by tapping the planking as before, and boring or " tapping the iron plating, and securing the wood to the iron " from the inside by parallel screws or by taper screws. In this " case also no galvanic action can arise with the sheathing.

" I propose to galvanize or tin the points or screws of copper " or patent metal bolts, so as to avoid contact and electrical " action between the copper or composition and the inner frames " in ships."

[Printed, 4*d*. No Drawings.]

A.D. 1865, May 1.—N° 1209.

JOHNSON, George.—" Improvements in iron fortifications, " such improvements being applicable to the construction and " protection of ships and floating batteries." The invention consists, first, in the construction of oblique or angular projecting casemates, employed in conjunction with low sloping breastworks, for the effectual deflection of shot. To construct the oblique casemate and sloping breastwork, the front face of such shelving breastwork, or parapet, is formed at an angle or " tumble "home" of about thirty degrees with the horizon; the glacis so formed is composed of thick armour plates of the usual description, resting upon and secured to framed spandril supports or wedge-shaped blocks; a backing of wood, stone, or other suitable material may be employed, if desired. At such point as it is intended to mount a gun a considerable portion of the glacis or shelving breastwork is omitted, so as to leave an opening large enough to admit of the gun being run out bodily, and allow sufficient room for training to protect the gun in front and flank. " I construct partly within or upon such shelving breastwork an " angular or oblique sided casemate; the enclosing walls of the " flanks are at their foremost ends, a distance of only a few feet " apart; a short wall encloses the front of casemate, in which " wall there is a gun port, connecting the two flank walls with " each other, the flank walls becoming wider apart as they recede " backwards, finally terminating within or upon the sloping " breastwork, and are thereto conjoined; these oblique side walls " of the casemate will deflect shot to the right hand or to the " left, whilst the shelving parapet will deflect shot in an upward " direction."

Secondly, in the adaptation and application of a cylindrical shield, barrier, or traverseport to embrasures for the protection of battery or broadside guns; by the use of this shield a gun can be trained through the arc of a quarter of a circle, that is, to an angle of 45 degrees either way, and still be completely protected.

The traverseport consists of a cylindrical body about eight feet in height, and about five feet in diameter; it may be composed of steel, rolled iron, or homogenous metal; at or near the middle of the traverse port is a porthole, in width just sufficient to receive the chase of the gun, and sufficiently high to allow of the elevation and depression of the muzzle; a loophole to pass the handle of the ramrod out at when loading, pierces through the axis of the traverseport in the contrary direction to the porthole, which it bisects and crosses at right angles. The traverseport is employed jointly with the oblique sided casemate and shelving parapet above described; it is placed in the advanced angle of the casemate, and directly before the gun. The traverseport is supported by and revolves upon a turntable, which turntable consists of a central boss turning on a pivot which is fixed to the floor, and rollers about eight in number, which rollers radiate from the centre boss and preserve their proper radii by means of projecting bearings made in connection with the boss. A circle of iron, termed the pivoting eye, loosely surrounds the traverseport at the level of the slide used for training the gun, to which slide the pivoting eye is rigidly attached; the said eye works between guides placed at its periphery, which guides are so fixed as to keep the eye central with the traverseport, and yet avoid friction thereon in passing round it; the traverseport will thus become the imaginary centre around which the gun is trained. The self-closing of the port is accomplished by utilizing the recoil of the gun; the traverseport and the gun being connected together by a chain, which passes between guide pullies fixed upon and near to the fore end of the slide platform. When the gun has to be fired, hand spikes or levers are inserted into mortice holes provided at the lower part of the traverseport, and are actuated by men who cause the traverseport to turn round to the extent of a quarter of a revolution; by this movement the gun is simultaneously drawn forward by the connecting chain, so as to be ready to enter the port now in a line with the gun, which is then run out and discharged through the traverseport; the gun recoils, and the instant the muzzle has quitted the port hole, the gun begins to pull the connecting chain, and so continues to do whilst retiring a distance of about four feet, whereby the traverseport revolves back again and assumes its former position, that is to say, the loop hole will again be in a line with the gun, whilst the port hole will lie in the contrary

direction, and thus present the solid sides of the traverseport to the enemy.

Thirdly, in a system or process for joining together pieces of iron, such as armour plates, the ribs and other parts of ships of war, batteries, or fortifications, and by which to impart great strength by and upon the following plan:—The thick armour plates, blocks, or strakes of iron of proper form and suitable dimensions are grooved all round upon their edges, or wherever they are to come in contact with one another. Each piece is grooved at about the centre of its thickness, and parallel with its surfaces, with a dovetail or other undercut groove. The width of the groove will be equal to about one-third the thickness of the plate, and of proportionate depth; similar grooves are also formed in their inner faces, transversely to their lengths, and at proper intervals to suit and fasten the plates to the ribs or frames of the ship. Each rib or frame is prepared with a dovetail groove at the edge that comes next to the armour plates. In constructing a vessel the said ribs or frames are moulded to the intended lines of the vessel, and are then set up in their respective positions. A plate is laid upon the substructure, the face of the plate having the transverse grooves above described is inwards, and abuts against the ribs, so that the grooves in the plate are opposite to the grooves in the ribs. "I then pour metal in a molten state " into the opposite dovetail grooves, and fill them up from the " bottom to the top edge of the plate. The metal is then suffered " to cool, and by these means the plate is firmly fixed to the ribs. " The same operation will be repeated to fix every successive " plate. As the work proceeds the grooves in the edges of the " plates will be brought opposite to one another, and all grooves " so brought together to be filled up with molten metal in like " manner."

Armour plates for the protection of wooden vessels can be fastened by the application of molten metal, and be conjoined by the process above described. The ribs for fastening the plates to the ship's side consist of flat flanged bars of iron, having a dovetail groove in each. These bars are screwed or bolted through their flanges to the vessel, their position being vertical and corresponding to the ribs of the vessel; to these bars the armour plates are attached by filling the opposite dovetail grooves up flush with molten metal, as previously stated; no bolt will thus

pass through or even into the plates, and thereby the perforations for armour bolts, which offer a direct channel for water to leak into the vessel, and which necessarily weaken the plates, are avoided.

[Printed, 2s. 8d. Drawings.]

A.D. 1865, May 2.—N° 1225.

CAMPBELL, Thomas Hay.—" Improving and strengthening " shields of steel, iron, or other material for ships, fortifications, " and other constructions." The invention consists " in the " employment of water or other liquid or highly compressed air " confined in cases or cisterns of copper, iron, or other material " as a backing to shields or plates of steel, iron, or other material " for the purpose of strengthening the said shields or plates and " preventing holes being punched through them by reason of the " rigid backing provided, and also for the purpose of diffusing " the shock caused by a shot striking the shields or plates over " so large a surface as to prevent its doing any injury to the ships " or other construction upon which the shields or plates are " placed." The cases or cisterns can be filled up at once and hermetically closed, by means of a force pump or other contrivance, the pipes being closed by screw plugs or other means.

" When this mode of backing is applied to a ship there should " first be a skin of ½ or ¼-inch iron placed over the outside of the " vessel; this skin to be free from projections on the outside; " next to this should come the case or cistern; next to it a skin " of one inch or 1½-inch iron, quite smooth on the side next the " cistern; then alternate layers of iron plates on edge, and " wooden planks, either vertical or horizontal. The iron plates " should be ½-inch thick and 10 inches broad, and the wood " planks between each should be 10 by 5 inch; on the outside " of this, resting on the edges of the iron and wood layers, " should be placed armour plates from 3 to 5 inches thick."

[Printed, 4d. No Drawings.]

A.D. 1865, May 9.—N° 1278.

HALKETT, John Cornelius Craigie. — " An improved " composition for coating iron or other vessels, and for other " similar purposes." The invention relates to " an improved " composition which is intended to be used as an anti-corrosive

" and anti-fouling mixture for coating iron or wooden vessels, " buoys, piles, piers, or other such structures as are exposed to " the deteriorating action of sea water, and which consists prin- " cipally of a mixture of a poisonous compound of mercury with " mineral tar or pitch, or with vegetable tar or pitch or other " substance of a bituminous nature in combination with oxide of " lead or sulphate of baryta. Various poisonous compounds of " mercury answer the purpose, but I prefer to use either of" those "mentioned in the Specification of Letters Patent granted " to Francis Cruickshank, dated 4th August 1864 (N° 1941). For " example, the tar, pitch, or other bituminous substance having " been previously dissolved in naphtha by boiling it therewith in " a closed vessel, I take one part by weight of the white oxide " of lead or of sulphate of baryta, and an equal part of one of the " poisonous compounds of mercury above referred to, and I mix " and stir the same well with an equal part of one or more of the " said bituminous substances dissolved as above named." The above proportions may be varied.

[Printed, 4*d*. No Drawings.]

A.D. 1865, May 20.—N° 1394.

MARTIN, JOHN.—(*Provisional protection only.*)—" Improve- " ments in apparatus for steering ships, steamboats, and other " sailing vessels." The improvements consist, first, in the application of a second barrel or pulley to the axle or shaft of an ordinary steering apparatus; to this second barrel or pulley "I " attach a set of chains or ropes by passing them round it; each " end of these chains or ropes is then passed round a pulley or " barrel fixed on each side of the ship's deck, and from thence " brought back to the ordinary tiller, and fastened to it in the " usual way." "The said barrel or pulley on each side of the " ship's deck is fitted into a moveable frame or carriage, sliding in " guides fixed to the deck. To this frame I fix a toothed rack, " geared with this rack, but fixed in an " independent " standard " is a pinion or worm screw; on the axle of this pinion or worm " screw I fix a lever, under the control of the steersman, so that " by turning the pinion or worm screw motion is imparted to the " moveable frame through the rack, the chains or ropes being " tightened or slackened as the moveable frame is removed from " or brought towards the tiller. When the second set of chains

" or ropes are tightened they control the steering apparatus as " effectually as the first or ordinary chains or ropes attached to " the tiller; when slackened they cease to exercise any control." The advantages are, that by having two sets of chains or ropes attached to the tiller the navigation of the vessel is less liable to be affected by the sudden shocks given to the rudder by the sea, and that in case of damage to the ordinary chains or ropes the second set can be brought into use at once.

Secondly, " I fix a drum or brake wheel upon the spindle or " axle of the ordinary steering wheel; around the drum or brake " wheel I pass an elastic band of metal or any suitable material, " each end of this elastic band I carry down towards the ship's " deck, one end being secured to a bolt or fastening in the deck, " whilst the other end is attached to a moveable lever, working " in a joint fixed on deck, and standing about nine inches above " it. When the sea strikes the rudder with such violence as to " deprive the steersman of control over the steering wheel, by " pressing his foot upon the upper end of the said moveable " lever the elastic band is pressed against the drum or brake " wheel until its stops the action of the steering wheel, and thus " enables the steersman to bring it again under control. Some- " times I attach each end of the elastic band (after passing round " the drum or brake wheel) to a moveable lever, that is, an" " independent lever for each end of the band, each lever being " fixed in a joint on the deck of the vessel, and placed so that the " steersman can readily take hold of the levers whilst standing " by the steering wheel. When the violence cf the sea renders " the steering wheel unmanageable, the steersman can let go of " it and apply the elastic band to the drum or brake wheel by " means of the two levers to which it is connected, and thus " restrain the action of the steering apparatus."

Thirdly, an arrangement is made by which injury to the rudder post is prevented when struck by a heavy sea; thus " I fix to the " deck vertically, near the tiller, a strong jaw or pillar of iron, or " any suitable material; in this jaw or pillar, at right angles (by " preference) I insert a strong lever, moving on a pin, at any " suitable distance from the end; on one end of this lever I form " or fix a clutch or catch, one side of which is bevelled or inclined " like a wedge, and the opposite side square or vertical; under " the other end of this said lever I fix a strong spring, one end " of which rests upon the ship's deck, whilst the other end

"presses against the end of the lever. On the tiller I form or fix "a clutch or catch similar to that on the lever, and corresponding "therewith, the two bevelled or inclined sides of the two clutches "being towards each other. The mode of action is this, when the "rudder is struck by a heavy sea, and thereby driven against the "aforesaid lever, the bevelled or inclined side of the clutch on the "tiller strikes against that on the lever, raising the clutch end "of the lever and compressing the spring under the opposite end, "the clutch on the tiller being driven under the clutch on the "lever, the spring again raises the lever to its primary position; "as the vertical sides of the two clutches or catches are now "opposed to each other, the tiller is thus retained until means "can be adopted to bring it again under control. I some- "times, by preference, fix a second shaft under the ordinary "tiller shaft; on the ordinary shaft and on the second shaft "I fix a spur wheel, connecting them together by a pitched "chain passing over them, the links of this chain working in the "teeth of the spur wheel on each shaft; to this second shaft I "attach a barrel or pulley, over which the second set of chains "or ropes pass for working the tiller, these chains or ropes being "worked over pullies fixed in a moveable frame or carriage, as "already described in my first improvement. I sometimes prefer "(instead of the moveable frame with rack and pinion, or worm "screw, for tightening the chains or ropes as described in my first "improvement) a spur wheel fixed on the second barrel or pulley "of the steering wheel shaft; on the outside of this spur wheel I "gear a clutch with teeth fitting into the teeth of the spur wheel; "to the clutch I attach a drum; around the drum of the clutch "I pass the chains or ropes; to this clutch I fix a lever for "moving it, then by turning the clutch round on the spur wheel "it recedes from or approaches the tiller, thereby tightening or "slackening the chains or ropes as may be required."

[Printed, 4*d*. No Drawings.]

A.D. 1865, May 31.—N° 1489.

SPENCER, THOMAS.—"Improvements in the composition and "manufacture of paints applicable to iron and other ships' "bottoms, and for other general purposes." The invention consists, first, in the use of "spathose ore," or proto-carbonate of iron, in the manufacture of a pigment or paint, to be used in

mixture with oil, turpentine or varnish, or any media with which paints, such as white lead, are usually mixed.

The paint prepared from this substance may be used alone, or in mixture with any other pigmentary basis. "The same ferru-"ginous carbonate (spathose ore) may also be converted for use "as a black paint by eliminating its carbonic acid in a retort or "oven by means of a moderate heat, not under 600 degrees of "Fahrenheit, or its blackness may be further increased by "placing in mixture with it one-sixth of its weight of charcoal, "which mixture must be kept at a dull red heat for from 9 "to 12 hours, by which the oxide or its carbonate becomes "converted into a black friable substance, well fitted for the "purposes of this invention. The simple oxide, or that prepared "in combination with the carbon, is then to be mixed with oils "or varnishes in the manner herein described. To make the "carbonate or the black oxide into paint, the dry substance must "in each case be first broken into small nut-like pieces and then "crushed into powder and passed through a fine sieve. The "sifted powder is then to be mixed with a sufficient quantity "of raw linseed oil, and rendered into a thick magma, after which "it is put into a paint mill, of any construction, and ground as "fine as deemed necessary. When thus treated the thick product "of the mill is to be thinned to the proper working consistency, "by adding to it either raw or boiled linseed oil, or spirits of "turpentine or varnish, or all these" in the proper proportions, with "driers." The colour of the paint may be altered at pleasure by adding to it any of the ordinary coloured pigments.

Secondly, in the application of metallic iron in fine powder for a paint to prevent the adhesion of the animal and vegetable bodies which foul the immersed portions of iron and wood ships, &c. When a sufficient number of coatings of this iron paint are given, and the work is thoroughly dry, its surface must be slightly rubbed with grit or pumicestone, or with coarse glass paper, so that a sufficient number of the metallic points of the paint shall be exposed to allow of the slow oxidation of the paint by the action of sea water. The object in thus inducing corrosion on the paint, is to render it impossible for the fouling bodies to fasten themselves thereto. This metallic iron paint is to be laid on over such anti-corrosive paint as may be previously on the surface of the iron.

[Printed, 4d. No Drawings.]

A.D. 1865, May 31.—N° 1496.

BROWN, William Augustus.—(*Provisional protection only*). —"Improved mechanical arrangements for steering ships and "other navigable vessels." The object of this invention is to so construct steering machinery that the orders or commands of the captain of a ship can be more readily and certainly obeyed than heretofore, and also to simplify the construction of such machinery.

"The following is an example of the means by which I propose "to accomplish the above objects. Suppose the steering wheel "to be situated on a stage amid-ships I fix on the axis of the "said wheel a spur wheel which gears into another spur wheel "mounted immediately under the former;" "the bottom wheel "aforesaid gears into a toothed rack mounted horizontally in "suitable guides; to each end of this rack I connect one end of "a chain which passes over pullies suitably placed along the gun-"wale of the ship, the other ends of the said chain are connected "to a long arm or lever fixed on the head of the rudder post. "The outer end of this lever I propose" "to connect with a "toothed quadrant to neutralize or lessen the tremulous or "vibratory motion of the rudder." "I do not intend to limit "myself to the use of two spur" "wheels and one rack aforesaid, "but propose as a further security to use a second steering wheel "fixed on the opposite end of the axis of the former wheel, and "to employ spur wheels and a rack similar to those already de-"scribed, thus forming a double action steering wheel which can "be used by a man at each wheel, or if desired one of the said "wheels may be disconnected and the single action only be "brought into use. I also propose to adapt a stop to the rack "bar aforesaid, to hold the rudder in a fixed position when it is "required to back the ship."

[Printed, 4*d*. No Drawings.]

A.D. 1865, June 8.—N° 1567.

COHEN, Barnet Solomon.—(*Provisional protection only.*)— "Improvements in sheathing or coating the bottoms of ships or "vessels." This invention has for its object "improvements in "sheathing or coating the bottoms of ships or vessels, and is "particularly applicable for protecting the bottoms of iron ships "from the adhesion of marine animals and vegetables. For this "purpose I employ veneers or plates of black lead, and I attach

" them to the ship's bottom by means of marine glue or other " suitable cement. The veneers or plates of black lead are manu- " factured in a similar manner to that in which strips of black " lead are prepared for the manufacture of pencils."

[Printed, 4d. No Drawings.]

A.D. 1865, June 9.—N° 1577.

HARFIELD, WILLIAM HORATIO.—" Improvements in appa- " ratus for steering ships and vessels." The invention fixes to the deck of the ship or vessel an iron frame, having two standards, one in front of and the other behind the rudder head. These standards carry in bearings the axis of the steering wheel; which axis passes directly over the centre of the rudder head, and has on it a pinion which gears with other pinions, one on each side of it, these latter pinions being fixed on two screws, the one right and the other left-handed. On the screws are nuts (conveniently made by casting metal on to the screws); they are fixed in blocks which, when the steering wheel is turned, traverse along the screws, but in contrary directions, the blocks being guided and steadied by the axis of the steering wheel, each block having a half-round groove on its edge and fitting against the axis. The nut and traversing block may be made together in one piece, but this is not so convenient. On the rudder head is a cross-head, it is forked at the ends, and in each fork is a slide or brass capable of moving radially to and from the centre of the rudder head. At the outer end of each sliding block a pin is fixed, projecting downwards and entering a hole, formed to fit it, in the slide or brass working in the fork of the rudder cross-head beneath. Thus the motion of the steering wheel is communicated to the rudder, and the further the rudder is put over, the more power has the wheel over it, in consequence of the slides or brasses in the cross-head moving out further and further from the centre of the rudder head.

[Printed, 8d. Drawing.]

A.D. 1865, June 14.—N° 1612.

MULLEY, WILLIAM ROBINSON.—(*Provisional protection only.*) —" Improvements in sheathing iron ships." " For this purpose I " first sheath the bottom of the ship with wood, the wooden " planking being secured by rivets or screws or in other con- " venient manner. Over the wooden sheathing I place a sheathing

"of sheet iron (either entire, perforated, or in bands), and over "this again I place a sheathing of zinc. The iron and zinc sheets "may be punched through together and nailed at the same time "on to the wooden sheathing beneath."

[Printed, 4d. No Drawings.]

A.D. 1865, June 24.—N° 1688.

BONNEVILLE, Henri Adrien.—(*A communication from Louis Prosper Reynaud.*)—(*Provisional protection only.*)—"Im-"provements in life boats." This invention relates to "certain "improvements in life boats, by means of which they are rendered "incapable of submersion, and better fitted for the use for which "they are intended. It consists of a metal tube or cylinder "hermetically closed and tapered at both ends, forming the body "of the life boat, and carrying a framework with seats for rowers. "The under part of said tube is provided with a false keel more "or less detached from the tube; this keel serves for supporting "at each end the lower sockets of rudders of a suitable form, "which enable the boat to move either ahead or astern without "turning, and at the same time serve in either case as cutwaters. "These arrangements render it impossible to submerge or over-"turn the boat under any ordinary circumstances."

[Printed, 4d. No Drawings.]

A.D. 1865, June 24.—N° 1692.

TURTON, George.—(*Provisional protection only.*)—"Improve-"ments in floating docks." The invention consists in the employment of a series of air or float cases, built and arranged separately, or in loose portions, and running along the upper part of the sides of the dock from stem to stern. Also in fitting hinged gates or a caisson to close the dock, and in a general arrangement and construction of floating docks, whereby the dock can be propelled or sailed at an equal speed to any ordinary vessel.

"I construct the docks of steel, iron, or wood, with floors, ribs, "or cross girders," either of solid plates, trellis, or webs, with angle iron reverse bars, running from the keel to the top of the side frames. "I insert in the sides scuttle or water-tight side "lights, provided with dead plates to protect the glass in the "sides of the dock. Inside the dock, and at the two sides I

" employ iron or wooden steps, staging, and platforms." "I use " bulkheads about every twenty feet for strength and safety in " case of collision."

[Printed, 4d. No Drawings.]

A.D. 1865, July 3.—N° 1755.

DEANE, EDWARD.—(*Provisional protection only.*)—" Improve- " ments in tubular structures, rendering them specially applicable " for ships' masts and building purposes." The invention consists in constructing tubular structures in such manner as to render them useful for the purposes of masts of ships and vessels, lighthouses, towers of observation, shafts for ventilation, passages for smoke, hoist shafts, and other purposes. The construction is thus described by the inventor :—" I form a tube, in the centre of " which I have an upright rod or core, which becomes the axis " from which a radiating stay or radiating stays proceed ;" " and " this core instead of being a rod or solid standard might itself be a " tube, and instead of a core or rod, I could, if thought desirable, " have a number of smaller upright tubes within the outer up- " right tube; and this arrangement could be combined with the " core and stay or stays before mentioned." The mode preferred is as follows :—" I have three upright stay plates (or I have a " number of boiler plates fastened together so as to form in effect " one plate, and use three plates thus constituted or constructed). " One of these three upright plates occupies the whole diameter " of the tube, and projects slightly beyond it for the purpose " herein-after described. The other two upright plates make each " a semi-diameter, and are secured to the first-named plate at right " angles; all these plates being fastened together by angle plates " and bolts or rivets, by which means a strong centre or core is " secured. The outer part of the tube is composed of four " segmental pieces, which have flanges, having the projecting " parts of the upright stay plates tightly secured between them " by means of bolts or rivets through all of them." " Instead " of three stay plates, four, five, seven, or other convenient number " might be adopted."

When the invention is adopted in ships of war it will be desirable to have inside the tubular structure, step pieces so that men may mount up inside; and also to provide loop-holes for the use of sharpshooters or otherwise.

[Printed, 4d. No Drawings.]

A.D. 1865, July 5.—N° 1775.

LONGBOTTOM, John, and LONGBOTTOM, Abram.—" An " improved combination of materials for the manufacture of " carpets, floorcloth, felt, wall paper, fireproof flexible roofing, " ship and boat building, and for other similar purposes." The invention consists in the application of certain well known materials to the manufacture of "an elastic, flexible, durable, water, " insect, and fireproof composition, which we call kampakaon, " and which is made as follows:—First, we dissolve, say, five " pounds of india-rubber with twenty gallons of ordinary or crude " coal tar naptha, and to one part by weight of this solution we " add two parts by weight of shellac ground to a fine powder, " constantly stirring the solution until perfect combination and " fusion is effected. Second, we dissolve and mix in, say, five " pints of water, at a temperature of about 190°, four ounces " alum, two ounces sulphate of ammonia, four ounces boracic " acid, five ounces glue, five ounces molasses, and five ounces of " boiled linseed oil, to which we add ten ounces of hydrochlorate " of ammonia. Third, we blend the before-named mixtures " thoroughly together at a temperature of about 200°. Fourth, " we prepare any woody or fibrous material, such as flax waste, " shevydan, mongo, cloth waste, flock waste, silk waste, hemp, " cotton, blanket, plush, velvet, or other flies or blowings, wool, " hair, down, turf, peat, schermac, tan, ground leather, ground " cork, ground colored listings, rags, and any other suitable " materials, by heating or boiling the same in a solution composed " of equal parts of double sulphate of potassa and alumina, sul- " phate of iron and borax. Fifth, we then place the blended " solutions with the necessary quantity of the heated woody or " fibrous materials in a powerful mixing machine, which mixing " machine we prefer to be enclosed in a steam jacket on the " principle of a mixing machine described in a Patent granted to " John Longbottom, dated the 18th of March 1846, No. 11,136. " This steam jacket must be kept during the whole course of " mixing at a temperature of from 150° to 200°. In this machine " the whole of the materials are to be incorporated one with the " other and made to form one perfectly homogenous mass. Sixth, " from the mixing machinery we cause the homogenous mass to " be well worked in a heated masticator at a temperature of about " 150°. Seventh, from the masticator we cause the kampakaon

" to be passed several times through a series of heavy iron rollers, " the first rollers to be heated to about the same temperature as " the kampakaon itself when taken from the masticator, but the " following rollers must be gradually cooler until the kampakaon " reaches the finishing rollers, which we prefer to be nearly cold." " After this we submit the kampakaon to a cold bath of metallic " salts, which, with the compounds mentioned in paragraphs 2 " and 4, renders it completely fireproof." "When the kampa- " kaon is desired to be of extra strength we accomplish the object " by inserting between two or more thicknesses thereof various " veneerings of fabrics, wood, or metal, cementing the same " together, after which it is again passed through the rollers."

[Printed, 4d. No Drawings.]

A.D. 1865, July 7.—N° 1807.

FENTIMAN, George.—" Improvements in the preparation of " paints." For the purposes of the invention shellac is pulled till it becomes white or nearly so, when it is dissolved in spirit. Gum tragacanth is dissolved in boiling water, and the two solutions are mixed together, and by such means a vehicle is produced with which ordinary colouring pigments are ground, or mixed. Camphor and other materials are advantageously added to the paints.

In place of pulling the shellac in the manner described, "I " sometimes bleach the gums after they are dissolved by passing " chlorine through the prepared solution " until the color is discharged. For very dark paints the bleaching may be omitted.

In the above composition the camphor is added to render the drying more rapid; the castor oil serves to make the paint work smoothly with the brush; the gum tragacanth gives tenacity to the compound, preventing it cracking and separating from the surface to which it is applied. Where the paint is to be used in a dry situation or climate the proportion of gum tragacanth may advantageously be increased; " sometimes I use the paint for " coating the bottoms of ships, and in this case the quantity of " resin may with advantage be considerably increased."

[Printed, 4d. No Drawings.]

A.D. 1865, July 8.—N° 1817.

PAPENGOUTH, Christopher Oswald.—" Improvements in " constructing ships and vessels." In order to render ships and

vessels more secure against the effect of shot, shells, and other projectiles, the sides and other parts which are to be protected by armour plating are, according to this invention, formed in the following manner:—The whole surface is covered by ends of metal tubes, by preference, of the best wrought iron, and of a circular section, either cylindrical or somewhat conical. These are rivetted together where they come in contact. The larger or outer ends of these tubes, when conical, should be about five or six inches diameter, but the diameter of the tubes may be varied. At or near the inner end of each tube is an internal rib or ring securely formed or fixed, against which the inner end of a strong coiled spring rests, whilst the outer end of such spring comes against a plug composed of a composition of india-rubber and gutta percha, or of other suitable elastic material. This elastic plug is drawn into the outer end of the tube by a chain, which is fixed to a spring within the plug, whilst the other end of the chain is drawn inwards by a screw nut on a screw attached to the chain, which passes through a plate, which closes the inner end of the tube. By these means the water is prevented getting into the interior of a tube, by reason of the tube being closed at its outer end by the elastic plug above mentioned. The plug at its outer end protrudes beyond the outer end of the tube, whilst the inner end of the elastic plug rests against the outer end of the spring which is within the tube. Each elastic plug receives against its outer surface the angles or corners of four rectangular armour plates or blocks, which are of comparatively small size, but they are made of any desired thickness, and each such armour plate or block is, at its angles, resisted by and rests against four elastic blocks, so that when any one of the armour plates is struck by a projectile, it will be resisted by four elastic plugs, one at each angle or corner, and such plugs at the same time will be resisted by four springs within four of the tubes above described. Through the centre of each block or plate is formed a hole, in the direction from front to back, to receive a bolt with a conical outer end or head. The inner end of the bolt is connected to one end of a short chain, and the other end of such chain is connected to a screw bolt, by which, and by a screw nut on the screw bolt, the armour plate or block is drawn tightly towards the ends of the tubes. In making the armour plates or blocks, the grain of the iron of the central portion of each block or plate is at right angles to the outer and inner surfaces thereof, whilst in the inner and outer surfaces of each

plate or block, the grain is parallel with these surfaces; but the inner and outer surfaces, and the central portion of each block or plate are welded together, and form a solid block or plate, possessed of greater power to resist impact, than if the grain of the iron were all in one direction.

These blocks are each to be clothed or coated with vulcanite. This coating of vulcanite need not be thick, but by reason of thus moulding the surfaces great accuracy of fitting of the blocks or sections is obtained, whilst the metal blocks or sections may be made only roughly to the desired form, leaving the precise and exact surfaces which come or butt together to be obtained by the vulcanite. The metal blocks so coated, and whilst in the moulds, are subjected to the heat necessary to produce the change of the compound of india-rubber and sulphur into vulcanite. In some cases gutta percha is used in the manufacture of vulcanite with or without india-rubber, but india-rubber with sulphur it is believed produces the best product, and for that reason it is preferred to use it; but if desired, gutta percha and india-rubber and sulphur may be used in coating the blocks or sections of armour plating.

[Printed, 8d. Drawings.]

A.D. 1865, July 12.—N° 1838.

McKEEN, THOMAS CATO.—" A new and improved mode of " elevating ships or boats in the water, to enable them to pass " over sandbars, shallows, and the like, and for raising sunken " vessels and docks." The invention consists in furnishing the vessel, of whatever description, with a strong metallic vessel of a suitable capacity, which will serve to contain condensed air. The air is to be forced into this vessel by suitable air pumps, operated by the engine, or by manual power, before the vessel starts on her voyage, or any time during the voyage, so that the condensed air will be ready for use at the appropriate time. With this vessel or air receiver is connected a strong pipe or main, and to this main are attached, at the required intervals along its line, branch pipes of any flexible material found best adapted to the purpose, which communicate with bags or buoys, each branch pipe being provided with a faucet, by turning which, the air can either be admitted into or excluded from the particular buoy to which the branch pipe leads. And it further consists in connecting with these bags, cords or chains, which are attached to the side of the vessel, and arranged in such a manner,

that these buoys can be thrown over the stem and stern and sides, and be brought under and near the keel while in an uninflated state, and while in this situation can be inflated simultaneously, or one or more at a time, so that the vessel may in a few minutes be elevated horizontally, or in that portion where she lies deepest in the water, so as to decrease the draught sufficiently to permit it to float over the bar, or other obstacle.

[Printed, 8d. Drawings.]

A.D. 1865, July 18.—Nº 1866.

LE PATOUREL, JOHN PAUL BAUGH.—" Improvements in " ventilators." The improvements consist, first, in having a ventilator fitted with " a chamber, stop and throttle valve, feed " and waste pipes, and so formed as to fit closely on to the inside " of the ship, securely covering the side scuttle or porthole; the " fresh air entering through the scuttle or porthole passes into " the ventilator, through the chamber of which it passes into the " feed pipe, and thence into the ship. This ventilator being fitted " with self-acting throttle and stop valve, any water entering " through the scuttle is met by the stop valve, which is fitted to " lift with the water, the stop valve rising throttles the feed pipe, " preventing the ingress of water, while at the same time it (the " stop valve) opens the waste pipe and admits of the water run- " ning to waste," or the waste pipe and stop valve may be dispensed with.

Secondly, in having a double tubular ventilator, with a space between the tubes fitted with a cowl head. At the bottom of the outer tube, a flange is formed, which bends under the inner tube, and extends in towards the centre of the inner tube six or more inches, forming a receiver, which receiver is fitted with a small self-acting stop valve and waste pipe. The centre of the receiver, which curves up, is covered with a valve or scuttle, worked by a rod direct to the top of the cowl head. A clear space is left under the lower part of the inner tube. The outer tube at certain distances from the bottom is fitted with glands to admit of the foul air entering the uptake, which is formed between the two tubes, while feed pipes, fitted in certain parts of the ventilator, admit air when required. By this improvement, fresh air enters by the cowl head, which is fitted to turn to the wind in the usual way, is forced down to the receiver, in which it recurves into the uptake, and continues its course through, carrying with it the

foul air admitted through the glands, acting the part of a syphon at the same time that it supplies fresh air where required. Any water entering through the cowl head is received into the receiver at the bottom of the ventilator, and let-off through the waste pipe.

Thirdly, in having a cowl-head ventilator standing on a case made for the purpose, and fitted with a collar, around which the cowl head turns in the usual way. In this case, the self-acting valve is fitted to lift with the water, throttling the feed pipe through which the air has to pass, at the same time it (the valve) opens the waste pipe, and admits of the water running off, the air entering the head of the ventilator, descends to the chamber (formed inside the case), thence through the feed pipe (or aperture) into the ship, or where required. Any water entering through the cowl head is caught in the receiver (or reservoir); thence, coming in contact with the self-acting valve, it raises it, and admits of the water running off, while a larger quantity of water rushing down the ventilator, raises the valve and throttles the feed pipe, preventing the ingress of water, while a little water remaining in the receiver will have the effect of cooling the air.

[Printed, 1s. 6d. Drawings.]

A.D. 1865, July 24.—N° 1919.

CROFT, McGRIGOR JOHN.—"Improvements in rudders for "steering ships or vessels." In order to obtain greater, quicker, and easier steering power, the inventor applies to an ordinary rudder a diagonally curved or oblique blade or blades of metal or wood, attached at either or both sides of the shoulder of the rudder at or about the water line. The blades stand out obliquely, curved at the upper and after part like wings. The remaining portions of the blades are in contact with either or both surfaces of the rudder. A rudder may be built up according to this design.

The said blades may be placed upon any part of the rudder, according to the purpose for which the ship or vessel may be used. Thus in war ships they may be placed deep and out of way of shots. In river steamers, merchantmen, or small boats, they may be placed about the middle of the rudder, or in such a position as to command the dense water. The blades may be fixed in an inverted position, in one or more pairs, by any convenient attachment.

The rudder may in all cases be furnished with slots, so that the blades may be slid into their position before being secured by bolts or screws; or, if preferred, the slots may be made in the blades.

[Printed, 8*d*. Drawings.]

A.D. 1865, July 26.—N° 1943.

PULMAN, FREDERICK, and GINMAN, RCHARD.—(*Provisional protection only.*)—" An improved composition for coating ships' " bottoms, and the surfaces of other vessels or structures which " are exposed to the action of sea water." The invention has for its object to prevent barnacles and other marine animals, or sea-weed or marine plants from adhering to ships' bottoms. The composition is particularly applicable for coating iron ships, but may also be advantageously employed for coating and protecting wooden vessels. It consists principally of iron slag, scoria, cinder, or scale, reduced in any convenient manner to fine powder, to which is added steatite or soapstone, also pulverized, and arsenic. In addition to these materials, gutta percha or other analogous gum, insoluble in water, together with shellac and pulverized rosin, is also employed. These latter substances are dissolved in naphtha or any other of their solvents, and the other pulverized materials when well mixed are added until the whole is made into a paste or paint which may be conveniently laid on with a brush.

[Printed, 4*d*. No Drawings.]

A.D. 1865, August 1.—N° 1986.

LA PENOTIÈRE, WILLIAM.—(*Provisional protection only.*)—" An improved composition for coating the bottoms of iron and " wooden ships, by which the same are preserved from fouling " and the iron from corrosion, whether internally or externally, by " sea or other water, or moisture, which is applicable to iron of " any kind exposed to the action of moisture." The improved composition is formed by the admixture of the following ingredients :—5 parts in weight of raw white lead, 4 parts in weight of the best hard wood charcoal, 1 to 2 parts of litharge, 1 to 2 parts of verdigris, 1 to 2 parts of yellow orpiment, 12 parts of the best boiled linseed oil, more or less. The solid ingredients are to be reduced to an impalpable powder, and the charcoal first mixed

with a small quantity of the oil, the other ingredients being added thereto gradually, and the whole mixed thoroughly.

The above mixture is used for covering wood, laying it on in two, three, or more coats, with brushes or otherwise, at a temperature of about 90° Fahrenheit.

For coating iron "I use the above ingredients, omitting the " verdigris in the first two coats, and add it in the subsequent " ones, all at the same heat."

[Printed, 4d. No Drawings.]

A.D. 1865, August 3.—N° 2010.

CATO, PETER.—" Improvements in the iron knees and riders for " ships' fastenings, and iron frames for wood and iron ships." The invention consists in the manufacture and use of knees and riders of rolled or forged iron, having a central web or a central and side webs, forged on their faces; such bars being bent and formed for knees and riders and frames of ships or vessels, whether such ships or vessels are built altogether of iron, or of iron and wood, known as composite ships; and in the union or junction of this " beam iron knee iron," and other sections of iron knees and riders at the throat or below the beams, or in any other part, to a solid part forming the angle of the knee and beam arm, and this solid part may be continued without any welding in the throat of the knee, as far down the side arm of the knee as convenient.

[Printed, 10d. Drawings.]

A.D. 1865, August 9.—N° 2064.

WEST, CHARLES.—" Apparatus for giving immediate warning " of undue heat, whether occasioned by fire, spontaneous com- " bustion, or any other causes, of leakage in ships, and of the " sudden irruption of water, and of the accumulation of choke " damp in mines." The apparatus consists of a hollow iron tube of such size and diameter as may be most suitable to the special purpose to which it is to be applied; but the dimensions of those to be generally used are about five inches in length, and twelve-sixteenths of an inch in diameter on the exterior, and about ten-sixteenths of an inch in the interior. The bore, however, of ten-

sixteenths does not extend beyond three inches of the five in length, the remaining two inches having a much smaller bore, varying from the sixteenth to the thirty-second part of an inch. Or in place of making the tube entirely of iron, it is preferred to make the portion with the smaller bore of vulcanite or wood, and to adapt it to the portion which is of iron by a male and female screw. The metal tube is closed at the larger end, and "I fill the " whole of this part with mercury. I then insert in the remaining " part or neck of the tube a closely-fitting insulated wire descend- " ing to within a short distance of but not touching the mercury. " The wire may be made adjustable by having a screw thread cut " upon it working into a corresponding thread cut in the vul- " canite or wooden neck, usually, however, it is better to fix the " wire after setting it in the first instance. When the apparatus " is exposed to heat the mercury" "will rise in proportion to the " increase of temperature, and make contact with the wire in the " neck of the tube at the degree of heat to which the instrument " may be regulated. I solder or attach a wire to the outside of " the metal tube. This wire is insulated and leads to the alarm " and indicator, and through these the metallic connection is " continued to one of the poles of the battery." "I prefer to fix " the tube to a suitable wooden frame, which can be readily " attached to any convenient part of the ship or building."

The apparatus used for giving warning of leakage in ships, consists of a perforated iron or other tube, which is fixed upright in the well of the ship. "I fix two pieces of metal at a distance " apart on the lower part of a circular piece of wood or other non- " conducting material, which is used to close the upper end of the " tube. A separate wire is attached to each of these pieces of " metal. These wires are suitably insulated, and one leads to one " pole of the battery and the other through the indicator and " alarm to the opposite pole of the battery. These two pieces of " metal are separated from each other, consequently the circuit is " broken. On one of the pieces I solder or fix a small spring, " which with a very slight pressure will make contact with the " other piece of metal. Within the tube I place a float of wood, " thin metal, or other material. The tube being perforated, as " already stated, will admit the water caused by the sudden irrup- " tion or leakage, which raises the float till it comes in contact " with the spring, herein-before described, and presses it on to the

" piece of metal above, and thus completes the galvanic circuit " and causes the alarm to be given."

[Printed, 4d. No Drawings.]

A.D. 1865, August 15.—N° 2109.

WILSON, William Oldfield, and WILSON, Joseph.—(*Provisional protection only.*)—" Improvements in self-acting " apparatus for extinguishing fire and sounding fire alarums." The object of this invention is a simple arrangement of self-acting apparatus capable of sounding a fire alarum and discharging steam, carbonic acid gas under pressure, water impregnated with carbonic acid gas or alum held in solution, potash or any other suitable alkaline solution, pyroligneous acid, or other like solutions or gases, such as are known to be antagonistic to combustion by fire, into any particular room or rooms, a ship's hold, or other enclosed space or spaces to which the apparatus may be fitted, on the opening of certain self-acting valves or taps, and consists of a system of pipes connected to a steam boiler, or to any receptacle containing the liquid or gases, or both.

The system of pipes referred to are fitted with taps or other suitable valves, which are capable of being opened by releasing a weight, weighted lever, springs, or other suitable mechanical arrangement connected therewith, which are prevented from acting and are held closed by means of cords made of any inflammable material, or by means of a wire, cord, or chain formed of lead or other metal fusible at a low temperature when brought into contact with fire.

A steam whistle or other sound signal or alarum may be fitted to pipes between the valves and the chamber, so that when the valves are opened the steam whistle, fog horn, or other alarum sounder will be acted upon; or, in the case of steam, gas, or other liquid under pressure, the whistle, fog horn, or other alarum sounder may be fitted with valves, and so arranged as to be opened in the same way as the valves. A float may be applied to the receptacles or closed vessel containing the water impregnated with carbonic acid gas or other matter described. The rod of the float is constructed so that on its falling a short distance it would relieve an alarum bell or signal. In some cases it is preferred to place a close vessel containing carbonic acid gas, under pressure or otherwise, in such a position that the steam as it rushes from the

boiler shall pass through the chamber containing the carbonic acid gas, by which means it will carry a portion thereof with it through a pipe into the room, chamber, or other enclosure with which it communicates, and this it is believed would materially assist in subduing the fire. Or the chamber containing the carbonic acid gas may have a valve or connecting pipe opened by the action of the steam as it passes through the steam pipe, in which latter case it will be requisite to have the carbonic acid gas under pressure.

[Printed, 4*d.* No Drawings.]

A.D. 1865, August 16.—N° 2120.

PARRY, Samuel.—(*Provisional protection only.*) — "A new "or improved composition for coating iron or wooden ships' "bottoms." First, paint over the bottom with zinc white, mixed with oxide of iron and red lead; secondly, another coat of zinc white mixed with oxide of iron; then mix and boil together the following ingredients, to be put on boiling hot:— 20 gallons palm oil, 14 lbs. arsenic, 28 lbs. red lead, 2 gallons boiled oil, 3 lbs. black lead.

[Printed, 4*d.* No Drawings.]

A.D. 1865, August 22.—N° 2162.

JONES, Derwas Owen.—"An improved apparatus to facilitate "the cleansing and examination of the bottoms of ships and "other submerged structures." The apparatus consists of a waterproof frame with elastic joints, and with a flexible face, closed at bottom and open at top. "I use in conjunction with "the waterproof frame levers or beams, shaped in accord with the "contour of the particular structure and part to which the frame "is to be applied, which levers on being pressed against the back "of the frame cause it to assume a form corresponding to that "of the structure. I introduce an india-rubber tube in the face "of the frame, and force more or less air into it. To use the appa- "ratus bring it in contact with the structure to be cleaned or "examined, pump out the water from the inside thereof, when a "tight chamber will be provided, in which men may safely "descend and work."

[Printed, 8*d.* Drawings.]

A.D. 1865, August 24.—N° 2173.

MOODY, JOHN.—" Improvements in floating lights, beacons, " floating batteries, and other vessels." The object of this invention is so to construct a floating vessel that it may remain comparatively steady on a rough sea. For this purpose the vessel is made of a star-like form, with four or other number of arms. It is made with a flat bottom, and over it is a deck arched in all directions. When the vessel is to be employed to carry a light or a beacon, a tower-like erection is made at the centre of the structure, in which may be any doors or windows necessary for the convenience of the crew. A floating structure of this description, suitably moored, will be useful to support and secure telegraph cables at convenient intervals, so that should any fault occur it will be one length only that it will be necessary to repair or replace. " I also construct floating batteries in a similar " manner; in this case the arched deck is formed of armour " plates and the central tower before mentioned is replaced by a " battery for guns. The structure may also be propelled by steam " power." The arched form of the deck will deflect the waves which break on it and will not oppose any great resistance to them, and will similarly deflect shot in the case of the floating battery.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1865, September 4.—N° 2273.

NEWTON, ALFRED VINCENT.—(*A communication from Edward Livingston Perry.*)—" Improvements in life rafts and surf boats." A wooden or other framing, composed of thwarts and gunwales, rests upon and is secured to the body of the raft, which consists of two or more cylinders made of duck or other suitable woven fabric, of the requisite strength and flexibility, and of a diameter commensurate with the intended capacity of the raft. The cylinders are permanently connected together, so that they compose a single body or structure, by means of membranes of duck or of similar material to that of which the cylinders are made, which membranes are either joined to the body of the cylinders at their sides or along the lines of their seams, or form an unbroken or uncut part of the duck or other material. These membranes are attached to the several cylinders at opposite points in the same horizontal plane. On the outer sides of the outer

cylinders are also membranes which extend from about the middle of the outer sides of the cylinders up to the thwarts to which they are lashed. Each cylinder is furnished with an inner cylinder or tube, made of gutta percha or india-rubber, or compounds of either, or of cloth combined with one or the other of such materials, so as to be air and water-tight. Nozzles are fitted in these tubes near their ends, by means of which they are inflated and collapsed. The deck of the raft is substantially composed of the upper surfaces of the cylinders and the membranes, the membranes completing the deck of the raft on each side and furnishing ample storage room for provisions and water. The raft is commonly rolled up or folded upon itself like a carpet. When occasion arises for its use it is unrolled and spread out; the gunwales are secured in their positions; the air vessels are inflated through their nozzles, and the raft is thrown overboard. The air vessels are wholly encased and protected by the cylinders, the material of which is to be of such a character as to be able to endure the strain of the inflated air vessels without injury, and without being weakened thereby, and also to protect the air vessels from fracture or injury from abrasion or blows, when the raft is in a surf, or passing through breakers, or when it comes in contact with any other obstacle. The cylinders and the air vessels are constructed of such lengths and diameters relatively that the latter cannot be inflated when enclosed in their cylinders to their full capacity, and if the cylinders should stretch by use to a diameter which will permit the inflation of the air vessels to their full measure, their diameters may be diminished by lacing up certain stays provided for that purpose.

[Printed, 6*d*. Drawings.]

A.D. 1865, September 8.—N° 2306.

WALKER, John.—(*Provisional protection only.*) — "Improve-" ments in mounting and working guns in ships, forts, and " batteries." "I first mount the gun slide upon which the gun " carriage is supported upon a shaft, free to revolve in a socket " or tube carried through the deck or floor, and free to move in " an elongated slot the inner face of which is circular at both " ends. For greater strength the shaft is furnished at the top " with a collar, and for the ready training of the gun I fit friction " rollers near the shaft and under the slide. In order to retain " the gun when trained I either use blocks or I apply a worm

" wheel on the head of the shaft. The worm may be used not " only to retain the gun in the required position but the gun " may also be trained by it. After firing the gun may be turned " round for loading.

" In order to work guns in pairs and to communicate an up- " and-down motion to them, to allow of one gun being raised for " firing while the other is lowered and protected to be loaded, I " support the bottom of my pipe or socket on a bed plate attached " by chains to a drum on or forming part of a horizontal shaft, " and on one side of that shaft, and I connect a platform to the " top of the socket. I cut away or leave a space in the deck or " floor to receive the platform. I make similar arrangements and " connect another pipe or socket on the opposite side of the same " horizontal shaft. Round the apertures in the deck or floor I " erect a short screen, which when the guns are in position for " firing comes below the level of the mouth thereof.

" One gun and apparatus balances the other, and supposing " them to be fitted amidship in, for instance, a gunboat, the " guns may be made to sweep the horizon. Now suppose the " slides with their vertical shafts fitted in the sockets, and the " guns and carriages on the slides. One gun will be up above " the deck ready for firing and the other will be below the deck " being loaded, in which act the gunners will be fully protected. " The deck gun fired, rotation is imparted to the horizontal shaft, " when that gun descends and the loaded gun is raised for firing, " and so on. Should two guns not be required, then a weight to " balance one gun and apparatus must be connected to the oppo- " site side of the horizontal shaft. For the midship guns the " sockets are not free to move in a slot as is the case for porthole " and embrasure guns.

" Instead of running guns out for firing, I simply bring the " muzzles up to or near the portholes or embrasures, and to " protect them and carry off the smoke consequent on the dis- " charge I place a tube on the outside of the gun and run it out " when the gun is ready for being fired; by sliding it along the " gun. In constructing new guns, I flute the outside of the barrel, " but for guns already constructed I place longitudinal ribs on " the inside of the tube; thus recesses are formed through which " the air is drawn and the place of discharge ventilated on the " firing of the gun."

[Printed, 4*d*. No Drawings.]

A.D. 1865, September 9.—N° 2316.

ROBERTS, Richard Percy.—"Improvements in cleansing "and coating the bottoms of ships and other submerged sur-"faces to prevent oxidation, and the adhesion of marine animals "and plants, also in compositions to be employed for these "purposes." According to this invention the iron is cleansed by dissolving or removing the oxide or rust by chemical means, and for that purpose a solution of sal ammoniac is employed, or an ammoniacal solution of caustic potash, soda, or lime, camphine, petroleum, naphtha, or other hydrocarbon, or acid or acidulated water (or water which has been rendered acid by mixing with it the farina of rye or other grain, and fermenting the mixture), or the surface may be exposed to the fumes of sal ammoniac, or it may be heated and rubbed with sal ammoniac.

If the surface is originally very slightly oxidized it will require only to be scoured with an ammoniacal solution, whilst if badly oxidised or rusted the inventor has recourse in succession to several of the substances above mentioned, applied in various ways, which are described, and he prefers to use the coating composition as quickly as possible after the iron is cleansed, that the naked iron may be subject to as little atmospheric influence as possible.

"In preparing the coating composition, I first make a varnish "consisting of gum or resin, dissolved in a spirit solvent. I "prefer, say, 90 parts by weight of methylated spirit, 20 of "shellac, and 2 of copal. To the varnish I add in the propor-"tion of from one to five parts by weight per cent. of cyanogen, "cyanic acid, or hydrocyanic acid, their salts, or any of their "definite chemical compounds. I also use iodine or bromine, "their salts, or any of their definite chemical compounds; or in "place of using alone any one of the salts, two or more together "may be used. In each case I prefer to employ the larger por-"tion, but for the sake of economy sometimes reduce the quantity "to one per cent. In using cyanogen, I pass a stream of that "gas through the varnish; in using cyanic acid, I add that acid "to the varnish; in using hydrocanic acid, I employ Scheele's "strength and add that acid to the varnish; in using iodine, I "add iodine to the varnish; in using bromine, I add bromine to "the varnish. I prefer, however, to use a salt or salts."

"I prefer to put on as the first or first and second coats the

" varnish consisting of shellac, copal, and spirit without any " admixture, and for the remaining coat or coats I use varnish " mixed with other ingredients."

" A base such as potash or soda may be put into the varnish " for cyanogen, cyanic acid, hydrocyanic acid, iodine, or bromine " to decompose and form a salt. I also use alone or in connec- " tion with those poisons which have already been stated, narcotic " and acrid poisons such as 'aconite,' 'croton tiglium,' and 'oil " 'of tobacco;' these poisons I prefer to mix with the varnish in " the proportion of one per cent. by weight. Nux vomica or " preparations thereof and acetate of lead may also be used, the " latter in the proportion of, say, five per cent. The composition " can be used for either iron or coppered or wooden vessels, and " for a coating for all materials which are submerged. The im- " provements apply to the interior as well as to the exterior part " of ships or other surfaces."

[Printed, 6*d*. No Drawings.]

A.D. 1865, September 19.—N° 2387.

CLARK, Edwin.—(*Letters Patent void for want of Final Specification.*)—" Improvements in floating dry docks." This invention relates to " a modification of the platform or gridiron described " in my Patent of January 19th, 1857 (No. 159), and in the " pontoons or saucers used in connection therewith.

" In place of using separate and independent girders for sup- " porting the platform or pontoon or saucer which is situate (as " described in my former Patent) between two lines of columns, " constituting my patented arrangement of hydraulic presses, I " combine both the girders and platform into a strongly framed " rigid platform, on which vessels may be directly raised by the " hydraulic presses with or without the use of a separate pontoon. " I further extend the girders of this platform (which run trans- " versely) beyond the lines of columns, and thus obtain great " length of base, on which I erect iron frames to the height " necessary to allow of placing horizontal or inclined shores from " them to the vessel. To these frames I attach iron frames or " blocks having vertical and horizontal faces which form steps or " altars for the shores, similar to those used in ordinary stone " dry docks. I also further propose to enclose the above-described " rigid platform with plates, and to convert the same into a water-

" tight pontoon, so that when it is raised out of the water with " the vessel blocked upon it, and emptied either by means of " valves in the bottom, as described in my former Patent, or by " pumps provided for that purpose, it may be capable of wholly " or partly supporting the vessel, thus relieving the presses of " the whole or the greater part of the weight of the load they " have raised. I propose to use the above system of framed " steps or altars not only in conjunction with the floating rigid " platform, as above described, but also upon my ordinary " pontoons as at present in use."

[Printed, 4d. No Drawings.]

A.D. 1865, September 27.—N° 2480.

BOFFEY, John, and SMITH, Charles William.—" Im- " provements in compositions used for coating metallic surfaces." The invention relates to the use of certain peculiar compositions to be applied to metallic surfaces for the purpose of economizing the heat imparted to boilers, steam pipes, cylinders, and other metallic surfaces, by preventing the conduction and radiation of heat therefrom; also to the use of certain compositions for preserving metals from oxidation or tendency thereto.

" In coating boilers and the upper parts of the inside of iron " ships we employ two compositions, one for the first coat or " covering next to the metal, the other for the second and sub- " sequent coat or coats. The first coat is to be about one-eighth " of an inch thick; pieces of slate or oyster or other shells should " be stuck into the composition whilst it is soft, and the whole " should be allowed to dry for two or three days. The materials " for this composition are 1 cwt. of mastic, 5 cwt. of whiting, and " about 14 gallons of boiled linseed oil. The mastic and whiting " are to be mixed together, and the boiled linseed oil added until " the composition becomes of the consistency of putty. Before " this coat is applied a little linseed oil should be rubbed over the " surface of the metal. The second coat is to be about half an " inch in thickness; when this coating has set, a third similar " coating is to be given of a similar thickness, and composed of " the same materials; other coatings of this composition may be " given. The materials employed for the second and subsequent " coating or coatings are 1 cwt. of Roman or Portland cement, " 3 cwt. of washed sand, 10 lbs. of cowhair; these materials are

" mixed with water to the consistency of putty, and are applied " with a plasterer's trowel.

" For coating the bilges of iron ships to prevent oxidation two " compositions are also employed; they are applied in a similar " manner to that set forth in coating boilers. The materials in " the first coating are 1 cwt. of mastic, 3 cwt. of whiting, 2 qrs. " (56 lbs.) of dry white lead, 2 qrs. of mixed white lead (white " lead paint). This composition is also to be applied with the " addition of slate or shells. The materials which we prefer " to employ for the second and subsequent coat or coats in con- " nection with the above-mentioned first coat are 1 cwt, of Roman " cement, 2 cwt. of washed sand. No hair is required in this " composition, and sufficient water is to be added to reduce the " materials to the consistency of putty; this composition used " alone, however, forms no part of the invention."

[Printed, 4*d*. No Drawings.]

A.D. 1865, October 7.—N° 2589.

GISBORNE, Thomas Matthew. — (*Provisional protection only.*)—" Improvements in the means employed for cleansing the " bottoms of ships or vessels." The invention consists in " the " application of sulphuric acid to the ship's bottom for cleaning " the same of any animal, vegetable, or other foreign matter " adhering thereto. For this purpose the sulphuric acid may be " applied to the ship's bottom, whether she is in or out of the " water, either in the form of a wash or of a jet, which if the " vessel is in the water may conveniently be conveyed to the " required place through any suitable pipe or pipes by pressure " produced in any known manner, by gravity, or mechanical or " expansive force."

[Printed, 4*d*. No Drawings.]

A.D. 1865, October 10.—N° 2609.

WOODWARD, John Garrison.—" An improved ventilating " apparatus for use in steamboats, vessels, and other places " requiring to be ventilated." The invention consists in a ventilating casing surrounding or contiguous to the smoke pipe or funnel, through which air is drawn from the engine and fire-rooms by the column of air ascending which is warmed by the smoke pipe. This current of air, taken from the engine room, conveys

away any noxious gases, dust, vapours, and also the heated air, and in place thereof the cool air will descend by a natural action through the hatchways, and this system of ventilation may be extended by pipes to the other portions of the vessel. The said ventilating case is also carried up above the top end of the smoke stack or funnel of the boilers, in order that the ascending ventilating current of air may increase the draft of air passing through the furnace.

A partition or hood extending down near the front of the furnace to a short distance above the fire-doors, serves to direct the circulating current of air in such a manner as to convey away all dust and vapours, and prevent the heat from coming into the engine-room.

There is also a casing made in sections so that it can be removed, surrounding the boiler, leaving an air space between itself and the boiler, the object of which is to retain heat and prevent the ventilating current of air cooling the boiler too much. This casing is to be retained in place by hoops running around the boiler, the metallic plates running lengthwise of said boiler, and, if preferred, openings may be left in the casing so that a small circulation of air may be allowed, to prevent the air becoming too much heated within the casing.

[Printed, 8*d*. Drawings.]

A.D. 1865, October 11.—N° 2618.

WARREN, Frederic Pelham.—(*Provisional protection only.*) —" Improvements in bolts, rivets, and the like fastenings, for " connecting together pieces of metal and other material." " My " improvements in bolts, rivets, and the like fastenings, for con- " necting together pieces of metal or other material, and which " are applicable to other useful purposes, consist in forming the " end or ends of a cylindrical or other sectionally shaped piece of " metal cut from an ordinary bar, or otherwise, in such manner " that when driven into a suitably shaped hole in the pieces of " metal to be united together the end or ends shall be expanded " and completely fill it so as to hold them in permanent contact; " and this I effect by splitting or otherwise dividing the end or " ends of the bolt or rivet so as to admit of one or more steel or " other hard metal wedges being inserted between the divided " parts thereof for the purpose of forcing the divided portions

"asunder when driven into a blind hole, that is, a hole only "drilled partially through the metal, or against a block, or when "set up at both ends by hammers, as circumstances may "require."

[Printed, 4d. No Drawings.]

A.D. 1865, October 14.—N° 2653.

MAC MILLAN, WILLIAM JARDINE COMBE, MASON, JAMES, and SCARBOROUGH, JOHN VICKERS.—"A certain compo- "sition having anti-corrosive and anti-fouling properties for the "preservation and keeping clean the bottoms of iron vessels, and "also for the preservation of iron submerged and iron structures "exposed to the action of the atmosphere or water." The invention consists of "a phosphoric, resinous, and gutta percha "composition," having anti-corrosive and anti-fouling properties. The iron must first be made as clean as possible, for which purpose a preparation is made, of sulphuric acid, five measures; unboiled tar or oil, one measure, and lampblack. Or, to an equal measure of powdered resin and lampblack, add sulphuric acid. The iron must, after the application of these preparatory mixtures, be well washed with water, and rubbed dry before applying the first anti-corrosive coating.

The first, or anti-corrosive coating, is prepared as follows:— Take of best asphaltum 20 parts, dissolve in bi-sulphuret of carbon, naphtha, or other solvent, until complete saturation has taken place; add by weight or measure one part of unboiled tar. Should a pure gutta percha coating be used as a second coating, the first coating will require to have ten parts of shellac, and ten of asphaltum, to one of bees-wax shellac dissolved in alcohol. One, two, or more of these coatings may be applied.

The second coating is prepared as follows:—Dissolve the asphaltum in bi-sulphuret of carbon, naphtha, or other solvent, to which add one part of phosphorus, dissolved in bi-sulphuret of carbon; then take shellac ten parts, dissolve in alcohol, mix the shellac solution with the asphaltum and phosphorous; the whole to be brought to the consistency of varnish. As every solution that can be applied to iron is porous, in order to contract the pores that may exist in the coating after evaporation, diluted sulphuric acid is applied. Another mode of preparing a second coating is as follows:—Take equal parts of resin and gutta percha, dissolve in

bi-sulphuret of carbon, naphtha, or other solvent, bring the solution to the consistency of varnish. After it is applied, in order to close the pores that may exist after evaporation, apply heat, and afterwards press the coating with some flat instrument, or cover it by a coating of equal proportions of gutta percha and phosphorous applied in small sections at a time on the vessel, and ignited, and afterwards pressed with a flat instrument.

"The third anti-fouling coating is last applied. It is prepared " in the following manner :—Take of phosphorous, 0·125 parts, " of gutta percha 500 parts, bi-sulphuret of carbon 2·000 " parts, dissolve. After being in solution, add turpentine 0·250 " parts, all by weight. One, two, or more applications of this " coating may be applied."

For the preservation of iron structures exposed to the action of the atmosphere, it is proposed, after the iron has been cleaned by the first preparation, to apply the first and second coatings, omitting the phosphorous in the latter, afterwards treating as before stated to close the pores. Any metallic oxide can then be applied.

"In preserving water tanks, we propose to apply the first and " second solutions, as in the iron structures exposed to the atmos- " phere, heated in the same manner to close the pores, after which " we apply a coating of pure gutta percha dissolved in the sul- " phuret of carbon."

Vessels built of wood may be advantageously covered with this composition. Apply the first solution, afterwards the second, omitting the phosphorous; above this, a covering of tin foil is put on with adhesive solution, and afterwards the anti-fouling or third coating.

[Printed, 4*d*. No Drawings.]

A.D. 1865, October 30.—N° 2791.

DWYER, ROBERT DOYNE.—" An improved coating for cover- " ing the bottoms of iron and steel ships, and other navigable " vessels and marine works, to prevent oxidation and the adhesion " of animal and vegetable matter thereto." This coating consists of an elastic, adhesive, and partially soluble mixture, made from the following ingredients, say, nine parts of tallow or fatty matter, two parts of rosin, one part of potash or other alkali, one part of red lead, ochre, or colouring matter, and three parts of roman cement. The tallow or fatty matter, rosin, colouring matter, and alkali are melted together by heat, after which alkali is added.

The fire is then withdrawn, and the roman cement is carefully added by degrees. It is preferred to add a portion of oil for the purpose of making the mixture work freely from the brush.

[Printed, 4*d*. No Drawings.]

A.D. 1865, November 2.—N° 2832.

CLARK, EDWIN.—(*Provisional protection only.*)—" An improved " method of sheathing iron vessels." This invention relates to the covering of iron vessels over their outer skin with one or more layers of planking, plain, creosoted, or otherwise chemically prepared, which is secured in place without bolting to the iron work; and if it be desired to sheath the vessel with copper the sheets will be fastened to the wooden planking outside in the ordinary way, by copper nails driven into the planking, and therefore will not be in metallic contact with the iron skin or frame of the vessel.

"The method of construction I prefer to use is to bolt or rivet " on the outside of an iron ship or vessel bent plates or bars of " iron, steel, or other suitable metal of an L, ∠, T, Z, or other " convenient form. The metal bars may be arranged either " horizontally, vertically, or diagonally, and between these " bars I drive in short pieces of timber, either horizontally, " vertically, or diagonally, making all the joints water-tight, " and this timber being separated from the interior of the vessel " by the iron skin may be creosoted or otherwise chemically pre- " pared. Over this I fasten another layer of long planking, laid " straight or diagonally, and fastened to the inner layer by copper, " gun metal, or other suitable screws. A second layer of short " creosoted or chemically prepared planking may be used between " the metal bars as just described, making the joints water-tight, " and where the vessel is also coppered I attach the copper " sheathing to the flush surface of timber by copper nails in the " ordinary manner.

" Instead of sheathing the ship with copper, the wooden outer " skin or sheathing may be painted, tarred, or covered with any " suitable chemical substance or preparation calculated to pre- " serve it or prevent the accumulation thereon of barnacles or " marine animals or plants."

[Printed, 4*d*. No Drawings.]

A.D. 1865, November 4.—N° 2851.

PAGE, THOMAS. — (*Provisional protection only.*)—" Improve- " ments in the means of preventing vessels from sinking, which

"means are also applicable for raising sunken vessels." The improvements consist "in the application of bags or flexible air-
"tight and buoyant receptacles, which I dispose in the hold and
"other capacities of sunken vessels, and by their inflation by
"pumping and forcing air thereinto so give buoyancy to the
"immersed or sinking vessel."

"A sufficient number of air bags being introduced, I inflate
"them by air tubes leading down from a vessel on the surface if
"operating on a sunken ship." "For the inflation of air bags in
"a floating vessel in danger of sinking, it may be effected by
"pumps, or bellows may be used below or on deck for the
"purpose."

The air bags or receptacles may be made of india-rubber and canvas, which air proof material may be further protected and strengthened by an outer covering of netting or matting. "In
"addition to air vessels so employed I also use solid materials for
"like purposes, by preference cork, which I enclose in coverings
"or nettings suitable for handling, disposing, or attaching.

"In removing what may be termed semi-fluid cargo in bulk
"from a sunken vessel, such as grain, guano, rice, nuts, nutmegs,
"and other small matters, I do so by the application of a centri-
"fugal pump preparatory to introducing the air receptacles."

[Printed, 4*d.* No Drawings.]

A.D. 1865, November 4.—N° 2854.

EDINGTON, James Charles.—(*Provisional protection only.*)—
"An improved mode of extinguishing fires in warehouses, offices,
"dwelling houses, theatres, ships, and other buildings or struc-
"tures." This invention relates to a peculiar combination and arrangement of water tanks, pipes, and jets, in connection with the interior and exterior of buildings, &c., with a view to the immediate extinguishing of fires therein; and consists in introducing into the building to be so protected a ramification of water pipes, provided with a number of jet pipes or tubes at different angles, at those parts of the building liable to take fire.

Each branch pipe is provided with stop valves, worked by a handle or pull in each of the apartments with which such pipe communicates; the connections between the valves or cocks and the handles being made by wires and bell cranks, after the manner of bell hanging. There will also be a second handle or pull in each apartment, communicating by wires with the main outlet valve.

In applying the system to ships the water would be supplied by steam or hand fire engines or pumps.

[Printed, 4d. No Drawings.]

A.D. 1865, November 7.—N° 2865.

ESPLEN, William, and CLARKE, James.—" Improvements " in steering gear for navigable vessels." This invention relates chiefly to the class of steering gear for navigable vessels which is actuated from any convenient position forward of the tiller head, and refers to improvements in hydraulic steering gear.

The various forms of hydraulic steering gear heretofore constructed "have been modifications of the Bramah press, requiring " pumps and valves; but in" this "invention the fluid is used " simply as a transmitter of a pressure, which may be commu- " nicated by and received upon pistons of equal areas. We get " the requisite mechanical advantage by using a screw and nut in " connection with the steering wheel, which may be placed where " most convenient, and thereby we apply the necessary force to a " piston or pistons or rams fitted in suitable cylinders, which are " connected by stout pipes to another cylinder or cylinders at the " rudder head, and the pistons or rams of the latter cylinders are " connected to a tiller on the rudder head, and the cylinders and " connecting pipes are filled with water or other fluid, so that a " force applied at the first cylinder or cylinders is transmitted by " two pipes to the opposite sides of the pistons or rams in the " cylinders at the rudder, and thereby moves the rudder. In this " way we construct a direct acting hydraulic steering gear without " pump or valve and with the fluid in the one pipe always distinct " from and not communicating with the fluid in the other pipe, " also by the use of loaded concussion rams we always maintain " a great pressure in both pipes."

"In some cases we find it desirable to give a slight elasticity to " the rudder, which may be done by inserting common hollow " india-rubber air balls in the water, oil, spirit, or other fluid " through which the apparatus is actuated, so as to form air " cushions, or we fit the hydraulic cylinders in immediate con- " nexion with the rudder head on the side or top with a small " cylinder and ram, the head of which is fitted with a spiral spring " or weighted lever to keep the ram in the small cylinder down " until an undue pressure is thrown upon the rudder, when the " piston in this cylinder presses up the spring or lifts the weighted

" lever, thus acting as a safety valve and giving a certain amount " of cushioning to the action of the rudder without allowing the " escape of the actuating fluid, thus forming a complete safety " valve system for the apparatus. The pressure on the ram may " be regulated by a set screw acting on a cap covering the head of " the spiral spring, and which said set screw works through the " crown or crosshead of a pair of standards, and we prefer to " cover the whole with a cylindrical dome-headed metal cover " screwed to the apparatus to prevent the same being injured or " tampered with."

[Printed, 1s. 4d. Drawings.]

A.D. 1865, November 20.—N° 2982.

WEEMS, JOHN.—" Improvements in the construction of ships." The invention consists in the construction of vessels with air-tight or partially air-tight compartments, in such a manner that, among other advantages, the following are obtained :—First, preventing, by self-acting means, wholly or in part, the rolling and pitching motion to which ships are subject when at sea; second, raising, depressing, or canting vessels when afloat; third, floating off vessels which may run aground; fourth, enabling vessels of heavy tonnage to cross bars and traverse rivers which they cannot now enter; fifth, affording easy access for the workmen to repair shot holes or other damage to the sides of vessels while at sea; sixth, enabling vessels to turn within a smaller circle more speedily; seventh, keeping sinking vessels afloat; eighth, causing barnacles or other parasites to drop from the sides of vessels.

" I construct my ship with an outer casing, between which and " the inner shell or hull of the vessel I leave a space of, say, for " example, eighteen inches. This casing is divided into two " parts by the keel, so that I have a separate compartment on " each side of the vessel extending entirely fore and aft, and from " keel to deck, or only part of the length and depth of the hull, " according to circumstances, for example, the requirements of a " war vessel differing from those of a trader, the position and " construction of the compartments will necessarily be modified " to suit them. The two compartments or chambers thus formed " between the inner and outer casing of the hull are made per- " fectly air-tight, or partially so, with the exception of a series of " holes or openings with which the outer casing is pierced at

" intervals along its length, such orifices being made by prefe-
" rence at the bottom of each chamber and near the keel of the
" vessel, which is the diaphragm separating the two chambers.
" Further, the top of each chamber is connected by a tube or
" tubes, conduit or conduits, to an air or other elastic fluid gene-
" rator, receiver, or containers, or to a single or double acting air
" or other fluid pump, or other suitable contrivance for forcing
" or exhausting air or other elastic fluids, these conduits being
" opened or closed by ordinary taps or cocks, or by any suitable
" valve or regulated opening."

The vessel being placed in the water on an even keel, the water will enter the spaces between the bottoms by the orifices provided, and will rise therein to the same level as the water in which the vessel floats, and as the air contained in the spaces or chambers cannot escape, the conduits being closed, each chamber will be filled above the water line with compressed air. Any tendency to incline will then be checked, firstly, by the weight of the water in the chamber on one side, which resists every effort to raise it above the outer water level; secondly, by the buoyancy of the air in the opposite chamber, which resists any further submersion of that side; thus when the vessel attempts to roll, both sides will present a resistance to the power of the wind and wave, as the air in the chamber on the windward side will be rarefied, and that on the leeward side will be compressed, thereby preventing her rolling, and keeping her steady. If desired, the resistance can be still further increased by forcing air or other elastic fluid into the leeward chamber, thus adding to the power of buoyancy.

To prevent pitching or heaving it is not necessary to interfere with the means for preventing side rolling. For this purpose " I place an air-tight partition or diaphragm " in each of the side chambers, about midway between the bow and stern, so that there are four chambers independently air-tight, or nearly so. When the bow of the vessel rises, the air in the forward compartments right and left of the vessel is rarefied, while the air in the stern compartments is compressed; thus we have a power of resistance forward and a power of buoyancy aft, these two powers acting in unison to prevent or ease the pitching motion of bow and stern.

To raise the vessel when in an upright position, air or other elastic fluid is forced in equal proportions at the same time into the chambers or compartments, displacing the water from the

level of the outside, and causing it to issue at the holes near the keel, until the pressure shall give a buoyancy sufficient to raise the ship out of the water to the height required, thereby enabling vessels to cross bars and traverse rivers which they cannot now enter. "It will be evident that by this means I could easily and " safely float off a vessel which may have struck upon a sub- " marine bank or rock, even if the rock have torn or fractured " her outer casing."

. To cant or careen a vessel, exhaust or withdraw the air or other fluid from one side, and at the same time force air or other fluid into the other.

" In adapting my invention to iron-clad or war vessels the air " chambers can be placed below the water line, and the vessel can " be canted over on either side for the elevation of the guns, and " the lowering of one side will be found to assist in moving her " round within a smaller circle, and more speedily than when on " an even keel, and in the event of pursuit the water in the cham- " bers may be displaced by air or other fluid, thereby raising her " out of the water and enabling a greater speed to be attained, or " air or other fluid or water may be admitted or displaced from " one or other suitably arranged chambers to bring the vessel " down by the head or stern, or otherwise alter or improve her " trim, and the vessel can also be sunk to the water level if it be " desired to present little or no mark for attack."

"The principle of this invention may be applied to the air or " water-tight compartments, and water tanks of ships con- " structed" "in the ordinary manner by fitting such compart- " ments or tanks with a tap and pipe or other suitable con- " trivance communicating with the water in which the vessel " floats, so that should the vessel become leaky or in danger of " sinking the water in the tanks may be displaced by air or " other fluid, and the air or other fluid in the water-tight com- " partments be compressed, and both powerfully assist in keeping " the vessel afloat."

" When I desire to cleanse the outer hull or casing from bar- " nacles or other parasites, I displace the water in the chambers" " by the introduction of steam, and thus raise the temperature of " the casing" "to such an extent that the barnacles will instantly " drop off the ship's sides, and for this purpose it is not there- " fore necessary to dock the vessel; further, the ship may then " be canted, and the exposed side painted while warm.

"In constructing ships with an outer casing or double hull a "great increase of strength and safety is obtained, as the outer "casing may be tied to the inner, to which it affords great pro- "tection, and to the ribs of the vessel by tie pieces placed where "the greatest strength is required."

[Printed, 1s. 4d. Drawings.]

A.D. 1865, November 22.—N° 3000.

COLES, Cowper Phipps.—"Improvements in protecting the "bottoms and sides of ships and other structures exposed to "the action of sea water," The invention consists in fixing on the bottoms and sides of ships and other structures exposed to the action of sea water, wire netting, thin perforated metal plates, matting, canvas, fearnought, or cloth, or thin wooden battens or laths, as means of affixing or holding cement, mortar, stucco, concrete, or other like protecting substance to such structures.

[Printed, 8d. Drawings.]

A.D. 1865, November 23.—N° 3012.

MULLEY, William Robinson.—"Improvements in planking "or sheathing iron ships and iron-framed ships." In sheathing iron ships with wood to fit them to receive copper, in order to attach the wooden planks to the iron skin of the ship, transverse undercut or tailed grooves are formed in the planks at suitable distances apart to receive short lengths of trough iron. The bottom of the trough iron, when it is in its place in the groove comes flush with the surface of the plank, and the top flanges of the trough enter the undercut portions of the groove. The sheathing thus prepared is secured to the skin of the ship by tap screws or fastenings, passing through the bottoms of the troughs and into the skin. Holes are bored through from the grooves to the face of the planks, to admit of the screws or fastenings being put in, and these holes are afterwards plugged.

In iron-framed ships the planking may be secured to the frame in a similar manner, the tap screws or fastenings entering the frame in place of the skin, as before.

[Printed, 8d. Drawings.]

A.D. 1865, November 25.—N° 3031.

FERRIER, John.—(*Provisional protection only.*)—"Improve- "ments in the hulls and tackle of navigable vessels, and in the

" gear for propelling the same by wind and steam or other motive " power engine, and clearing the same from water, and in apparatus connected therewith, to enable the said vessels to be converted into floating graving docks or lifts for raising vessels and " other submerged or partially submerged heavy bodies to or " above the surface of the water." This invention consists, first, in the construction of the body of the hull of a vessel (which may be of any desired model) with a double bottom and sides, which will have a sufficient cavity or space to give the required floating capacity, when empty, for lifting a submerged or partially submerged body, when placed between the sides of the vessel. Such vessel may resemble an ordinary vessel, but the ends are formed by means of moveable pontoons, which rest on the double bottom and between the sides of the vessel, where they are secured by beams, bolts, and nuts, the joints between the pontoons and sides of the vessel being made water-tight by means of a vulcanized india-rubber pipe, which takes into a cavity formed in the external sides of the pontoons, and counter cavities formed on the inside of the sides of the hull, into which pipes or tubes water or other fluid is forced under pressure to insure a perfect joint, which enables the vessel to be navigated to any required place and used for the conveyance of freight. It is preferred to make the pontoons forming the bow and stern so that the stem and stern post fall inboard, for the purpose of giving stability to the pontoons when detached from the sides and bottom of the vessel, which pontoons may be used separately as lifts, or they may be attached to the body of the vessel in any convenient way, that their lifting power may operate in conjunction therewith.

2. In the use of iron or steel tubes set up in the form of shrouds, except that they are arched at the top, and attached to a strong arched tension bar, which is also formed of a metal tube or of plate iron, which tension bar is securely made fast to the pontoons forming the stem and stern of the vessel. The courses or lower sails are suspended from the fore and aft tension bar in any convenient position; the top masts are fitted into sockets formed on or attached to the said fore and aft tension bar, and may be fitted with tops, crosstrees, shrouds, and sails in the usual manner.

3. In using twin screws, on the shafts of which are fitted, within the hollow sides of the vessel, screws enclosed in a chamber which has a passage opening therefrom into the interior of the sides of the vessel, and has also port openings extending through the

vessel's sides, which latter port openings are fitted with valves, which are capable of being opened and closed by hand, the use of these enclosed screws being to act as pumps for clearing the double bottom and double sides of the body of the vessel from water. Steam or other motive power engines are used to work the twin screws, and the archimedean pumps or water clearers. It is preferred to fit ordinary pumps in addition to these, with independent steam or other power, to the body óf the vessel.

When this vessel is used for navigable purposes, for long voyages, she is fitted with moveable beams, on which a deck or platform is laid for the purpose of the passage. When the vessel is used as a floating graving dock, for lifting navigable vessels or other submerged or partially submerged heavy bodies, the rigging, deck, and deck beams are removed, after which one or both of the pontoons forming the bow and stern are disconnected from the body of the ship and floated away; then water is admitted through suitable valves into the hollow bottom and sides of the vessel until she is sufficiently submerged to allow the vessel or other body to be floated or drawn in between the sides, when the water within the hollow bottom and sides is driven out by the rotation of the enclosed screws on the screw shaft; after which, as much water as possible being taken out by this means, the valves on the port openings are closed, when the remainder of the water is drawn out by the ordinary pumps and independent power.

It will be observed that there will be a propelling power imparted by the water driven out by the enclosed screws on the propeller shaft, which said screws are fitted with clutch or other disconnecting gear, so that the same may be thrown out of action when the port openings are closed, by which arrangement the external screw propeller on the same shafts may be used independently when required.

[Printed, 4*d*. No Drawings.]

A.D. 1865, November 27.—N° 3042.

LAKE, William Robert.—(*A communication from William Barney Watkins.*)—"An improved composition for enamel, paint, varnish, cement, or plaster." "I take about equal quantities by " weight of fine white marble and an alkaline silicate, the silicate " being about 25 to 30 degrees Baumé, and mix them well " together until the same is about the consistency of thick

" cream, then grind them together." "I use sometimes a less " weight of the silicate to the marble used. If it is to be used " as a plaster or cement, I use about two parts of marble to " one part of the silicate; if for an enamel, I use about equal " parts; if for a paint, I use about two parts by weight of the " silicate to one part of marble, the silicate being of specific " gravity about 20 degrees. I use in the paint about equal parts " of carbonate of lime, as, for instance, Paris white or whiting, " that is to say, equal parts of dry fine white marble and car- " bonate of lime, with about twice its weight of the silicate " aforesaid at 20 degrees. I use in the composition for the paint " about one part of white oxide of zinc to every four parts of " marble used, and I use about one part of china clay or white " clay to every 10 or 12 parts of marble used. All these sub- " stances I grind in a mill before using, except it is for a coarse " paint. I can and do use in the above composition of matter " which forms my enamel, cement, plaster, and paint, and which " I have described, some of the following earthy and metallic " colors, for the purpose of giving color to the composition of " matter, terra sienna, red and yellow ochre, india red, vermillion, " ultramarine, oxide of iron, alumina, red chalk, chromes, ivory " and lamp black, &c. The alkaline silicates which are used for " the purpose of a gloss or varnish over the surface of the paint, " enamel, and plaster is prepared as follows:—I use the same " silicious silicate that I form my composition for paints. I add " from 5 to 10 per cent. of marble in powder to the silicate, which " silicate should be 18 to 20 degrees Baumé, and then heat it " until a thick scum rises on the surface. Then I let it settle, " and when it becomes clear I use it as a varnish over the white " colors, I use it to saturation, and to the extent of producing a " fine gloss. For the purpose of varnishing over colors I use the " same silicates prepared in the same manner with from 2 to 3 " per cent. of a white oxide of zinc, instead of the carbonate of " lime or the marble as aforesaid." After the first application of one single coating of the paint or enamel to any substance, and after it becomes dry on such surface, it resists water and is insoluble, and is also blaze-proof to fire. "I can use on my " composition of matter when it becomes dry on the surface, " either in the form of enamel or paint any of the well known " resinous or oil varnishes instead of a silicate varnish if preferred, " with a good result. In the use of the enamel paint for the

"purpose of covering iron, steel, or other solid metallic sub-"stances," "I apply heat to the article so covered," "not to "exceed 300 degrees Fahrenheit."

[Printed, 4d. No Drawings.]

A.D. 1865, December 9.—N° 3171.

CLARK, Samuel.—"An improved construction of steering "apparatus." This invention relates to the steering of steam vessels by means of a pair of balanced rudders, which are mounted parallel to each other, and move together, so as to retain their relative position, the objects designed to be attained being increased efficiency in steering with a decreased expenditure of power. These rudders, when applied to a vessel fitted with a screw propeller, may be set in advance of or abaft the screw.

The twin rudders are mounted on central vertical spindles, which spindles extend up above the deck, and are stepped in bearings carried by the dead wood. At their upper ends these spindles severally carry an arm, which is firmly secured by a key. Each of these arms passes through a link attached to or forming part of a horizontal sliding rod, of which there are two, one on each side, extending along the vessel under the deck timbers to a spot near which the steering wheel is mounted, which may be in any given central position on the deck. The steering wheel is mounted on a shaft, to which are keyed two worms, which are right and left handed, and into these worms respectively gear horizontal segment racks, mounted on vertical spindles, on opposite sides of the steering wheel shaft. This shaft may conveniently be fitted with a second steering wheel, or one at each end. At the lower end of the spindles, segments are keyed, to each of which are attached cross chains, that are respectively secured to the inner ends of the horizontal rods before mentioned. As therefore the steering wheel is moved, a corresponding motion will be imparted simultaneously through the gearing coupling chains, and sliding rods, to both rudders, and a rapid and very efficient action on the ship will result.

[Printed, 10d. Drawings.]

A.D. 1865, December 13.—N° 3220.

McKILLOP, Henry Frederick.—"Improvements in appa-"ratus for cleansing ships' bottoms." The invention has reference

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to improvements in the apparatus employed under and by virtue of Letters Patent bearing date August 24th, 1863, "and granted "to me for an invention for improvements in cleaning ships' "bottoms. I apply to my said patented apparatus externally an "additional belt or belts so constructed as to be flexible or jointed, "and made of rope, wood, or other suitable material. To the "belt or belts, and as part thereof, I attach or apply wooden or "metal rollers or cylinders set upon a series of pads or paddings "of yielding material; the rollers or cylinders should be of suit-"able dimensions and moveable to admit of proper adjustment, "and I prefer the use of cylinders with a piston worked by "hydraulic power or pressure, as by that means the edges of my "said apparatus can be made to press and close upon or fit into "the various parts of the ship or body acted upon, and any "inequalities in the surface or lines thereof. By hauling upon "the belt or belts when in position and properly adjusted greater "pressure is obtained upon the sides and bottom of my said "patented apparatus and a perfect fitting or adhesion between "the same and the surface of the ship or other body to be acted "upon is secured."

[Printed, 4d. No Drawings.]

A.D. 1865, December 20.—N° 3287.

HARRISON, Joseph John, and HARRISON, Edward.—(*Provisional protection only.*)—"An improved mode of and appa-"ratus for purifying and deodorising impure air, whether in "buildings, ships, mines, or sewers, which improvement is also "applicable for ventilating purposes." The improvement consists of a chamber, receptacle, or box having any desired form or configuration, and so arranged that portions of carbon, charcoal, or other disinfectant may be contained within it upon open shelves, through which air can freely pass; or the bottom of the said chamber supporting the disinfectant must be perforated, and so constructed that air may have a free passage through such perforations into and amongst the carbon, charcoal, or other disinfectant placed therein. The circulation of the air may be effected as follows:—Upon the top of the said chamber or box, a little above the disinfectant, a lamp is placed, which, when burning, heats or rarifies the air in the immediate neighbourhood, and has the effect of creating a draught or current through the chamber, thereby purifying the air by its contact with such charcoal, and

rendering it thoroughly wholesome. The requisite current of air may also be created by the employment of a fan, air-pump, or other equivalent placed in the same position as the lamp before mentioned, and driven by means of a coiled spring or other mechanical equivalent.

[Printed, 4d. No Drawings.]

A.D. 1865, December 22.—N° 3313.

ANDERSON, JAMES.—" Improvements in apparatus to facilitate " the cleansing, examination, and repair of the bottom of ships, " and other submerged structures." The invention consists in constructing a flexible frame or apparatus, which will adapt itself to the contour of the particular part of the ship or other structure to be cleansed, examined, or repaired.

The frame or apparatus is constructed of horizontal ribs or bars, the ends of which are bent at right angles or nearly so, and which are backed with planking, metal, canvas, or other suitable material, the whole being connected in the following manner, so as to form a flexible frame :—" Every section of the frame carries at each end " a quadrant-like plate, a portion of which overlaps the quadrant- " like plate on the next section, the two plates being connected " to each other by a pin or otherwise, so that the sections are free " to turn inwards or outwards. The joints of the sections or " spaces between them are protected by shields constructed of the " same or other material, and carrying at each end a plate fitted " at right angles to the shield so as to embrace a portion of each " of two adjoining quadrant-like plates. The plates on the shields " are formed with a vertical slot, in which a pin on one of the " quadrant plates rides, moving therein according as the frame is " bent to the contour of the ship. I strengthen the apparatus " inside by stays, which may be adjusted by screws at their ends, " the screws being turned as required to bring them against the " ship's bottom and act as a bearing surface to support the centre " of the apparatus. Horizontal bars extend from these stays to " the sides of the apparatus."

The invention also consists " in applying to the edges of the " apparatus before described, which come in contact with the ship " or the edges of similar apparatus, a pliable spring facing com- " posed of blocks of wood, which are fitted at their back with " springs; the blocks and springs are covered with thrummed " canvas, sheepskin, or other material calculated to effect a

" water-tight joint against the foul or irregular bottom of the " ship. The apparatus is further made secure by a waterproof " covering of canvas or other material, and I fit at the sides and " bottom of such covering a row of springs, which may be fitted " between blocks of wood or a row of blocks of wood; the " blocks may be faced with thrummed canvas or other suitable " material; they carry brackets or frames extending back to about " the level of the outer edge of the apparatus, to which each " frame is connected by a rod or bar. Between the apparatus " and the row of blocks at each side a wire rope is hauled taut " round the ship's bottom, and a rod at the bottom of the appa- " ratus connects these two ropes, which pass through eyes near " its ends; upon these wire ropes and this rod I fit sheaves, and " I fit a corresponding sheave to each of the rods or bars which " connect the blocks to the flexible apparatus. These sheaves " form pulleys, which being hauled upon by ropes carried from " the sheaves up to the deck cause the row of blocks and the " flexible apparatus to adapt themselves to the contour of the " ship. Sometimes I form an independent water-tight joint of a " double row of springs fitted between blocks as above described, " which may be used in addition to those on the apparatus and " on the waterproof covering."

Rectangular openings are formed in some of the plates, which openings are fitted with guards extending above the surface of the water. These openings serve to pump out the water, and then to admit workmen into the apparatus as well as for passing down tools, plates, or other materials as required; they also serve to ventilate the apparatus. Sight holes in the shields or plates may be fitted with glass or other transparent material. The apparatus is covered when in use by a waterproof covering, which is made to fit round the guards.

[Printed, 2*s*. Drawings.]

A.D. 1865, December 26.—N° 3339.

DEANE, WILLIAM FRANCIS.—(*Provisional protection only.*)—
—" Improvements in the means of applying copper or alloys of " copper to the bottoms and sides of navigable vessels built of " iron, steel, or homogeneous metal." This invention consists " in applying a solution of copper (by preference sulphate of " copper) to the surfaces to be acted upon by means of a water- " proof material, which is secured to the vessel, either by adhesion

" or by mechanical means. The iron or other metal to be covered " is coated with plumbago, or otherwise prepared to receive the " deposit of copper, or the alloys thereof, either by contact or by " the insertion of zinc in the copper solution, or by the usual " galvanic, electric, or other process, by which copper is deposited " from a solution when acted upon by the galvanic, electric, or " other battery, or by whatever means the same may be applied. " The copper or the alloys thereof may be deposited in any thick- " ness, according to the strength, quantity, and time occupied in " applying the same, and the surfaces acted upon may embrace " either the whole side, or bottom, or any portion of them. Any " ironwork which it may be thought expedient to cover may be " done in the same manner. By the terms waterproof material " are included vulcanised india-rubber, cloth, and all fibrous " substances suitable for holding and applying copper solutions, " as herein-before described."

[Printed, 4d. No Drawings.]

A.D. 1865, December 28.—N° 3352.

WHEELER, NORMAN WILLIS.—"Improvements in the con- " struction of sea-going vessels." The first part of the invention consists in giving one or more of the decks a sheer or vertical curve in the opposite direction to the sheer of the rail, so that while the rail or bulwark is highest at the ends, for the purpose of better receiving the action of the waves in heavy weather, the decks serve more efficiently to brace the ship to resist hogging strains.

The second part of the invention " consists in the employment, " in combination with the above, of a curve or quadrant form of " a portion of the deck beams on such vessels, so that the decks " midships are curved higher at the middle than at the sides, and " are joined to the sides by the said curves or quadrants with one " or more recesses when the quadrants are omitted and the decks " not extended with a curve at the side but dropped with a right " angle or nearly right angle off-set."

The quadrant deck referred to is a deck having the greater part of its surface parallel or nearly so with the deck below, but at the sides the beams are curved downwards and rest upon the rail or some part of the hull, and have the deck planking continued around the curve. A deck of this kind may be safely carried to a greater height above the water than can the nearly vertical top

sides, or the usual deck-houses, for the reason that the action of the wind is less upon the rounded sides of the quadrant deck than upon the straight topsides or deck-houses of equal height; and the quadrant deck is a light, though a stronger structure than the deck-houses. With the improved sheering of the deck and the rail, the quadrant deck will naturally fall to or below the level of the rail at the ends, and afford fair and nearly level spaces of considerable extent near the ends, upon which men may stand while working the mooring and anchor gear. If the quadrant deck be continued intact the whole length of the vessel, as above described, it would be difficult, and sometimes dangerous, for men to approach the extreme side of the vessel, except near the ends, where the curve has disappeared. Recesses are therefore constructed at proper places, with their floors near or below the level of the rail, and in these recesses are placed the bitts or timber heads, and sometimes coal shoots and ventilators. These recesses may be covered when the vessel is at sea, or the [recesses not in use, by shutters.

[Printed, 8*d*. Drawings.]

A.D. 1865, December 29.—N° 3367.

NAPIER, JAMES ROBERT, and RANKINE, WILLIAM JOHN MACQUORN.—" Improvements in rudders." The invention relates to the shape of the rudder of a vessel propelled by the screw, and the object of the improvements is to increase the efficiency of the screw for propelling, and of the rudder for steering.

It consists in making the rudder of such a shape that when it is in the midship position it has its side surfaces at each point of its forward edge tangential, or as nearly as practicable tangential, to the streams of water driven obliquely aft by the screw, and that when it is in the same position it has its side surfaces at each point of the after edge standing in a fore-and-aft direction, or as nearly so as practicable, the side surfaces being fair and continuous between the forward and after edges.

"The said shape embodies two distinct improvements, one of " which may be used without the other. Thus the shaping of the " side surfaces tangentially to the streams of water driven ob- " liquely aft may be employed alone, in which case it will not be " confined to the forward edge of the rudder. The effect of this " first portion of our improvements is twofold; on the one hand, " to avoid or diminish the abrupt checking of the transverse com-

"ponent of the motion of the water which is produced by the "ordinary form of rudder with or without a rudder post, and is "a cause of shocks to the vessel and machinery, and of waste of "power, and on the other hand to improve the steering action of "the rudder by ensuring that as soon as it is put over to an "appreciable angle all parts of the streams of water driven ob- "liquely aft by the screw shall begin to press on that side of the "rudder towards which its after edge is put over, instead of some "parts of those streams continuing to press on the contrary side "of the rudder until it is put over to an angle equal to the ob- "liquity of the motion of those parts, as is the case with the "ordinary rudder."

The other portion of the improvements consists in making the side surfaces of the rudder fair and continuous from the forward edge (shaped according to the first portion of the improvements) to the after edge, shaped so as to stand fore and aft, or nearly so, so as to cause portions of the surfaces to gradually deflect the streams of water or portions of them from oblique directions into a direction due aft, or nearly so, whilst the reaction upon the rudder of the water whose motion is so deflected produces an additional forward thrust, co-operating with the thrust of the screw in overcoming the resistance of the water to the motion of the vessel.

"The kind of rudder to which we prefer to apply our invention "is that commonly called the balanced rudder, that is to say, a "rudder without any rudder post or after stern post, and having "part of its side surfaces afore and part abaft the axis about "which it turns. Nevertheless our invention may be applied to "a rudder with a rudder post also, in which case we prefer to "shape the side surfaces of the rudder post so that they shall "form continuations of the side surfaces of the rudder in its "midship position."

[Printed, 10*d*. Drawings.]

1866.

A.D. 1866, January 3.—N° 21.

SIMONS, William.—(*Provisional protection only.*)—"Im-"provements in the conveying of materials and in apparatus "employed therefor." According to this invention, vessels or barges for carrying goods are formed with a large open rectangular hold, which is fitted with a number of square boxes or buckets, which can easily be lifted or withdrawn. The vessel is provided with steam engines and a propeller, the model and general arrangement being such as to enable such vessels to proceed to sea with conditions of safety equivalent to those of an ordinary sea-going screw steamer. When it is intended to load one of these vessels or barges, it is brought alongside the wharf, and the coal, ironstone, or other material is shot into it in the usual manner; thus each of the boxes or buckets previously placed in the hold becomes immediately filled, and in a very short time the barge is loaded and ready to start. The port to which the cargo is bound has the wharf, by preference, arranged with an elevated railway, upon which a travelling steam lift is placed. The vessel or barge is moved beneath the projecting end of this elevated railway, when the chain of the steam lift is lowered and hooked by a bargeman to the balance handle of one of the buckets, which is at once raised, and whilst thus suspended is conveyed to a depôt situated a short distance inland. In place of using an elevated railway, an ordinary crane may be employed for raising the buckets or cases out of the barges. When arrived at the depôt, the boxes are emptied, and the lift immediately returns them to their places in the barge or vessel. In this way the whole of the boxes may be rapidly emptied in succession, and the vessel or barge relieved of the cargo in a considerably less time than under the present system.

[Printed, 4*d*. No Drawings.]

A.D. 1866, January 10.—N° 87.

PAPENGOUTH, Christopher Oswald.—"Improvements in "constructing ships and vessels." This invention consists in the application of corrugated iron or steel plates at the back of

external armour plates; backing of wood, or of other material, being also employed when desired.

The manner of using corrugated iron or steel plating may be varied, and the corrugated iron or steel may be employed in one, two, or more thicknesses or layers. When two or more thicknesses of corrugated iron are used, it is generally preferred that the corrugation of one thickness or layer should cross the next thickness or layer at an angle, generally at right angles. The armour plates, may, if preferred, be in small sections, so as to admit of each block or plate being fixed by means of a single stem or bolt, in which case they are arranged in such manner that each plate or block may be supported by four other plates at the back. Between the surfaces thus pressed together, vulcanized india-rubber or other suitable elastic material is interposed. The stems of the armour plates are, by preference, fixed by screw nuts to the interior of the corrugated plating, where only one layer or thickness thereof is employed. "I employ blocks of vulcanized india-"rubber of like dimensions with the armour plates and the plates "which are at the back thereof, so that these elastic blocks at "their outer ends produce a complete elastic surface, the edges or "sides butting together so as to produce water-tight butt joints. "In the interior of each elastic block I sometimes introduce a "strong spring of steel, and these elastic blocks, together with "the steel springs, are fixed by screw bolts and nuts to the body "of the ship. When using two or more layers or thicknesses of "corrugated plating with armour plates fixed by one stem or "bolt to each, then I prefer that the stem or bolt of each armour "plate should pass through both corrugated plates where the "corrugations cross or intersect each other, and I fix the stems "or bolts of the armour plates by screw nuts. In some cases I "employ more than two thicknesses or layers of corrugated "plates, and in some cases the corrugations of one layer or thick-"ness in place of crossing the others at angles, as before described, "the corrugations of one partially enter the spaces between the "corrugations of the plates next to them. I also use in com-"bination with one or more layers or thicknesses of corrugated "plates armour plates of large dimensions, and fix them with "screw bolts and nuts, and I employ therewith elastic blocks or "thicknesses of vulcanized india-rubber, which may when desired "have steel springs therein, as before mentioned."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1866, January 13.—N° 120.

SMITH, HENRY FRANCIS.—" Certain improvements in the " manufacture of beds or mattresses to be employed on ship- " board, or in similar articles to be used as supports in water." The invention is designed for the purpose of sustaining or floating bodies or weights in or upon water, and may be applied to beds or mattresses on shipboard; in the manufacture of supports in cases of shipwreck; to pontoons, rafts, bridges, buoys, and protections to bathers, or to other similar purposes where buoyancy is required.

The chief feature of the invention is the use of a fabric, impenetrable to water, as a covering for straw or other similar material of a cellular construction, so as to depend upon the air naturally contained in the straw for support, and to prevent the water from displacing the same, by which means life-sustaining beds may be supplied to ships at as economical a rate as the description now used.

[Printed, 4*d*. No Drawings.]

A.D. 1866, January 13.—N° 124.

PRINCE, ALEXANDER.—(*A communication from George Palmer Ball.*) — (*Provisional protection only.*) —" Improvements in the " means of preserving timber from decay." This invention consists, firstly, in the immersion of the timber in crude petroleum, until complete saturation is effected.

In order to accomplish this, " I propose to place the timber in " a suitable vessel or receptacle and to exhaust the air therefrom " by the ordinary means of preserving wood by saturation, after " which the crude petroleum is conveyed into the vessel and " thereby caused to penetrate into every pore or interstice of the " woody fibre, the effect being to thoroughly preserve the wood " from decay."

" I also propose to mix any cheap mineral paint or pigment " with crude petroleum to be used as a coating for the bottom of " ships before the application of the sheathing, and also to all " timber for buildings or other purposes, the composition not only " renders the timber indestructible, but repels the attacks of " insects.

[Printed, 4*d*. No Drawings.]

A.D. 1866, January 20.—N° 190.

GEDGE, WILLIAM EDWARD.—(*A communication from Lëonard Goursseau, junior.*)—" An improved construction of careening " basin or graving dock." This invention " is based upon an " assemblage of sheet-iron tubes supporting a bottom," " and an " openwork flooring or lower deck, which can be immersed with- " out any resistance when the piston," with which each tube is furnished, " is drawn along within the tube, so that it fills with " water, and which emerges so soon as the piston driving out the " water causes a vacuum, the water introducing itself into the " tubes, giving weight to the detriment of the resistance drawn " from it by the piston, and regaining its power under the action " of the piston which forces out the water and restores the " vacuum and the power which was lost."

The tubes, which are horizontal, are composed of sheet iron of length and thickness proportioned to the capacity of the basin. They are open at one end and closed at the other, the closed part being furnished with a hawse hole or funnel communicating with the upper platform or mid-deck of the caissons at the sides. The open side of the tube is provided with a hawse hole or funnel similar to the preceding, but without adhering to the tube. The interior of these cylindrical tubes contains a valve forming a piston. This piston is composed of a solid piece of iron, provided with a groove intended to receive an india-rubber or leather washer, which is to perfectly adhere to the inner surfaces of the said cylinder and close it. The chains working the pistons are conducted over pulleys, one fitted within the closed end and one on the exterior of the open end, in passing to the horizontal shafts placed in the between decks of the sides of the basin. These chains are received on the horizontal shaft by driving pulleys with catches, which receive, wind, and immediately unwind them, to permit them to fall into a chain well made in the side caissons of the basin. There may be one row of tubes, or two rows, one above the other. The basin, which is entirely sheathed, has in its bottoms as many openings as there are tubes, but these openings are grated, to prevent the introduction of floating debris into the said tubes.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1866, January 23.—N° 219.

HEALEY, CHARLES EDWARD HEALEY CHADWYCH.—(*Provisional protection only.*)—" Improvements in closing the hatchways " or deck openings of ships and side ports or openings in the " same." " I employ to close the engine room hatchway or other " hatchway, or side or stern or bow ports, shutters or blinds " constructed on the principle known as the 'revolving principle,' " which shutters are so fitted that by the aid of any suitable gear " in common use they may be coiled up," when not required, " beneath the deck or in any other suitable situation."

[Printed, 4*d*. No Drawings.]

A.D. 1866, January 24.—N° 232.

HALL, WILLIAM KING.—(*Provisional protection only.*)—" Im- " provements in the construction of boats." The object of the invention is to construct boats which when not required for use may be folded so as to occupy comparatively small space. " I " connect the stem and stern posts to the keel by joints, so that " they can be folded over on to the keel, and I also connect by " joints to the keel stays or braces, the outer ends of which, when " the parts are in position for use, bear against and support the " stem and stern post. The frames or ribs are secured in joints " or sockets when required for use by pins and cotters or other- " wise, and can be taken out when the boat is to be folded up. " I continue the ends of the frames or ribs, or some of them, " above the gunwale, so as to form rowlocks. All these parts may " be constructed of metal or wood, and I cover the whole with " prepared canvas or other waterproof material laced or secured " to the gunwale. One or more air tubes may be fitted at each " side or other convenient part of the boat, which when inflated " will act as fenders and also as supports."

[Printed, 4*d*. No Drawings.]

A.D. 1866, January 24.—N° 235.

WATT, JOHN MILNE.—(*Provisional protection only.*)—" An " improved composition for coating materials and structures." This invention has for its essential object the coating of such substances as iron and other metals or materials so as to preserve

them from decay. According to one mode of manufacturing the coating composition it is preferred to employ about 12 parts by weight of sulphate of soda, to 16 parts of Portland, Roman, or other suitable cement. These two ingredients are thoroughly mixed together in a paint mill or in any other manner; after which some silicate of soda is added, as well as a portion of boiled linseed oil and paraffin, when, if necessary, the composition may be again passed through the mill so as to effect a more thorough admixture, the proportion of these ingredients varying with the nature of the purpose to which it is to be applied. The composition under this mode of preparation being in a liquid state, it is ready to be applied by means of a brush as an ordinary paint to any purpose for which it is intended, such as the outside of iron ships' bottoms. In place of preparing the composition in this manner a larger quantity of Portland, Roman, or other cement may be added, by means of which it is applicable as a cement for preserving the interior of ships' bottoms, as well as for other purposes.

Under the first-mentioned modification it may, under some conditions, be found desirable to employ a portion of the silicate of soda in a crystalline state, so as to effect a more complete combination of the entire ingredients.

[Printed, 4*d.* No Drawings.]

A.D. 1866, January 25.—N° 252.

GARDNER, HENRY.—(*Provisional protection only.*) — "Im-" provements in machinery or apparatus for cleansing the bottoms " of ships and other submerged structures." The machinery or apparatus is constructed and arranged as follows:—"I fit to the " side of a vessel, in proximity to the ship or other structure to be " cleansed, one or more supports, upon which a framing is hung " or jointed to enable the framing to be moved horizontally to " suit the curve of the body to be cleansed. On the outer end of " the framing is a shaft on which a toothed wheel is mounted; " this wheel is in gear with another wheel on a second shaft " driven by a band or chain from an engine on the deck or other " part of the vessel. The first-mentioned shaft carries a series of " wheels, the peripheries of which are shaped to receive links or " other like appliances to which laths are connected; the laths are " formed with or carry teeth, scrapers, or brushes which are

" caused to press against and remove all impurities from the " structure; the laths " may " pass round other wheels attached " to the end of the framing before mentioned; these side rods are " free to be moved by levers and chains so as to bring the teeth, " scrapers, or brushes against the structure." The framing and parts connected with it can be raised and lowered, or moved horizontally by suitable tackle to conform to the curve or shape of the structure. The degree of pressure the apparatus exerts against the structure can be regulated by rollers on the framing, by spars (telescopic or otherwise) fitted with rollers acting against the side of the structure, and by ropes or chains. The teeth, scrapers, or brushes may be arranged side by side in one framing, or in separate framings. Instead of the framing being carried from the side of the vessel it may be connected to an upright or uprights on the deck or other part of the vessel. The driving chain is caused to pass round a quadrant or weighted wheel to keep it taut.

In some cases the apparatus may be secured to the structure itself, and driven by an engine or other means, either on that structure or not. " I suspend or fit a screen (say of network) to " catch or collect the refuse, which screen can be raised or lowered " as required."

" The vessel to which the machinery or apparatus is connected " I propose to be provided with propelling power, so as to move it " along as the work proceeds." The laths may be fitted with springs to allow them to yield should they press too heavily against the structure.

" I also construct an apparatus for enabling a workman to " examine the progress of cleansing." This apparatus consists of a rectangular case, having portions of the sides made of glass. It is open at the upper end, and the other end is weighted to keep it vertical while in the water; the apparatus is lowered over the ship's side to the part to be examined.

[Printed, 4*d*. No Drawings.]

A.D. 1866, January 26.—N° 256.

JOHNSON, John Henry.—(*A communication from Henry Randall.*)—" Improvements in the construction of steam vessels." The invention consists, firstly, in so framing steam ships as to ensure with a flat bottom and light draught great strength in a

vertical direction, so as not only to prevent a sinking of the extremities and rising of the middle, but also to prevent a rising of the extremities and sinking of the middle of the ship; also to ensure greater strength laterally, and to effectually prevent any twisting or wreathing motion or tendency to roll, thus rendering a ship not only steady, but firm and rigid in every part throughout its entire length, enabling it to stand up squarely in any sea, and to be always in trim, allowing the swell of the sea to pass under it (instead of dashing against its sides or quarters), and enabling the ship to ride the waves with more ease and greater safety.

It is proposed to effect this by making the main deck timbers project outboard sufficiently far to be trimmed off and be capped by horizontal arches of sufficient curvature to embrace the paddle boxes, and extending nearly from stem to stern. And, further, by making a sufficient number of the ribs extend above the main deck timbers (to which they are firmly connected) far enough to be trimmed off and be capped by vertical arches sprung from stem to stern, or nearly so. With these improvements are connected the application and use of inverted counter arches, tension braces, and diagonal tie-rods at the bulkheads.

And, secondly, in using the propelling power of steam vessels in such manner as to obtain greater security and speed. This is to be done by the employment of two distinct sets of paddle wheels operated by two separate engines in separate compartments of the ship, the after pair of wheels being about one-eighth larger than the forward pair, so as to take up the slip of the latter when making the same number of revolutions, and being situate, if on a vessel, say, 500 feet long, about 130 feet aft, or in that proportion, or so far aft as to take the water just where it is coming to rest from the impetus it has received from the forward wheels, and where it is about commencing to adhere to and in a sense drag after the ship, or, in other words, commences to be dead water, or water which leaves or parts from the vessel with far less velocity than she advances. Thus these paddles on the one hand, not only have a firm dip in comparatively smooth water which does not run away from them, but on the other hand they give the water a fresh impetus, carrying it quickly in, under, and beyond the curve of the vessel's run, closing her in with live water, and greatly relieving her from the adhesion or drag referred to. The employment of two distinct sets of propelling apparatus

in separate compartments of the ship not only gives her double the safety (as in case one set should break down the other set will carry her into port), but it also secures many other important advantages, such as distribution of weight of machinery, coal, or cargo about the ship, according to its strength and buoyant capacity, which equalizes the strain on the ship and reduces liability to accident. It also gives double the float surface to act on the water without any increase in the number of engines.

The method of applying the power dispenses with masts, spars, and sails.

[Printed, 10*d*. Drawing.]

A.D. 1866, January 26.—N° 257.

ROUX, François Louis.—" Improvements in the mode of and " apparatus for applying copper sheathing to ships constructed of " or plated with iron." The invention relates, firstly, to a peculiar mode of applying copper sheathing to iron and iron-plated ships or vessels, in combination with insulating materials for prevention of voltaic action between the two metals; and, secondly, to improvements in the tools or apparatus by aid of which the said sheathing processes are or may be carried into effect.

Preliminary operations.—The portions of the hull intended to be sheathed are first carefully cleaned and dressed so as to clear off all traces of oxide of iron, all the cavities existing therein being also cleared out and stopped with minium cement. This done, the surface is covered with a coat of minium paint. The sheets of copper are then adjusted to the positions they are intended to occupy on the vessel, and are afterwards shaped by means of a shearing apparatus, the rivet holes being marked off at the desired points, and thereafter punched out in the ordinary way. The sheathing is then temporarily attached to the hull, and the centre of each rivet hole is marked on the latter by a point. This done, it is withdrawn, and the traces of the pointer are enlarged by a punch, so as better to determine the centre of the hole, and to facilitate the piercing which is afterwards effected by boring bits. The holes thus pierced, being brought to uniform diameter by the opening bit, set in a suitable brace, are countersunk by means of the spring branch tools. These tools, the extremities of which are enclosed by pincers, are successfully worked in the holes in the same manner as the opening bit, each operation being indicated

by a distinct external sign, so as to avoid the possibility of error. The centre of each hole is then finished off by another special tool, and is stopped by a frieze or other washer, after which a second coat of minium paint is applied to the whole surface.

The operations above described being completed, the hull is covered to the depth of, say, about one-eighteenth of an inch, with a coat of insulating matter, such as the cement for which Letters Patent were granted to the inventor, under date of 23rd March 1864, N° 728, or any other plastic compound of like nature possessed of insulating, adherent, and elastic properties, combined with inalterability when exposed to the action of sea water. In order to ascertain and clear out the rivet holes, concealed by the cement, the sheets of copper are again set in position, and a piercer is forced through the cement at the points corresponding with the punching. In the cavity formed by this piercer is driven a spirally formed punch, by which the cement is cut out from the hole down to the washer, set at the bottom, and the holes are finally cleared out by a double worm.

The rivets are formed of copper, peculiarly shaped, having a head, a collar just below the head, and an axial hole extending up a little way from the bottom. Under the collar is set a washer made from an alloy of seven parts of tin to three parts of lead. The head of the rivet is inserted in the cavity of the setting tool, and the stalk being passed into the hole pierced in the hull, is secured by hammer strokes applied to the head of the tool. In this operation the metallic washer sinks into the cement, while the collar sinks into the washer, thus forming a perfectly water-tight adjustment. As a further precaution against the admission of sea water, which alone can give rise to destructive voltaic action, a second coating of cement is applied to the hull, so as to cover the entire surface, with the exception of the rivet heads. If so desired, the rivets above described may be replaced by copper or other metallic screws. The rivets situated on the overlapping lines of the sheathing are covered with a thin strip of lead, and each middle rivet is fitted with a leaden washer of about one-fiftieth of an inch in thickness, previously pierced at the centre. The strips are pierced when being set in position by a special tool. Both strips and washers are made to adhere to the cement by a hot mixture of eight parts of vegetable tar to two parts of dry pitch. The surfaces thus prepared are then covered with large thin sheets of lead or other malleable metal, which are made to adhere by the

same means as the leaden strips above mentioned. Finally, each sheet of copper is set in its place, commencing at the top of the after part of the hull, and the rivet heads are closed down in the ordinary way. To remedy the disadvantages in this plan, resulting from the overlapping of the metal of the hull, the inventor adapts to each seam a series of wooden laths of prismatical form, set end to end, and secured to the hull by strips of the soft metal alloy before mentioned, spaced about twenty inches from each other. These laths are covered with cement and sheet lead, over which is placed the sheet of copper which is fixed by rivets to the parts corresponding with the wooden fittings. The hulls sheathed by this process present an undulating surface, which however offers less resistance to fluids than the edges of the overlapped plates. The sheathing applied as above described offers the double advantage of preserving the sailing qualities of iron or armour-plated vessels, and of protecting the hull from external injury.

In order to protect the interior surfaces from oxidation, a layer of cement is applied within to the bottom of the vessel, as also to those parts of the inner walls which correspond with the coal bunkers. The surfaces thus prepared are afterwards covered with Portland cement, a layer of from one-half to two-thirds of an inch being sufficient for the coal bunkers. The bottoms, however, should receive a solid bed of this cement to the height of the fashion pieces, a channel way being formed in the middle to carry off the water.

[Printed, 3*s*. Drawings.]

A.D. 1866, January 26.—N° 259.

AMBROSE, Edward, and BRADDON, William. — "Improvements in apparatus for lowering boats, part of which "apparatus is applicable to other uses." According to this invention an upper beam or stretcher is fitted to extend from one of the two ordinary davits to the other, and a lower beam or stretcher is suspended from the upper one by a rope or ropes as herein-after stated. In this lower beam or stretcher are fixed three drop hooks, from which the boat is suspended at or near the middle and the two ends. These three drop hooks are connected together by means of a trigger, line, chain, or rod, so as to admit of their being simultaneously opened by pulling a line passed over sheaves or a rod connected to bell cranks fitted to the lower beam

or stretcher, and thereby disengaging the boat at its three points of suspension simultaneously, as required. The boat can be hung at any convenient distance below the lower beam, and it can be lowered to any required extent (before being disengaged from the suspending hooks) by means of two ropes passed over sheaves in the upper and lower beams, thence passed over cleats or sheaves in the lower beam, and wound on to pulleys or drums mounted in the lower beam. The apparatus for regulating and controlling the lowering of the boat, before it is disengaged from the drop hooks, consists of an endless chain passed over a grooved pulley with projections on it, such endless chain being also, if required, passed round a cleat fixed to the lower beam. A check or holder consisting of a spring fixed at the lower part to the reel or cleat, or fixed part over which the rope is passed, with a space at the upper part of the spring in which the rope may be confined, is employed to hold the boat up in its position after it has been raised, while the loose ropes are being wound on to the pulleys or drums. This check or holder is also used to support the boat by holding the endless chain. The spring, check, or holder may be fixed in other situations, and applied to the holding of ropes or chains for other purposes. If preferred the upper beam above described may be dispensed with, and the sheaves connected to the chain or rope that is ordinarily passed from one davit to the other.

[Printed, 8*d*. Drawing.]

A.D. 1866, January 29.—N° 285.

CLARK, William.—(*A communication from Samuel Brown and Leon Level.*)—" An improved detachable or disengaging eye for " launching boats from the sides of ships and for other purposes." This invention consists in furnishing an eye which, while forming a perfectly secure connection, may when necessary instantaneously be disengaged. The eye is opened by pulling down a lever which raises a slide. In the application of the invention to a boat the hooks of the blocks are fitted into such eyes, which are closed, and the levers have cords or chains attached to them, which pass under rollers at the bottom of the boat, and have their inner ends connected to a ring. On drawing up this ring the levers will be caused to open the eyes at both ends of the boat simultaneously, so that the boat will be disengaged at once at both ends and drop

horizontally down on the water. The ends of the levers may be loaded, or have weights attached, in order to keep the jaws in a closed state.

[Printed, 1s. Drawings.]

A.D. 1866, February 1.—N° 321.

MURRAY, Andrew.—"Improvements in steering apparatus." The improvements relate to hydraulic steering apparatus. Heretofore when the rudder of a ship has been acted upon by an hydraulic cylinder, the pressure of water has been produced by the action of pumps; these improvements consist in the use of two cylinders, which when once filled with water or other liquid are intended to remain full, the water or liquid in them being made to circulate or pass from the ends of one cylinder to the ends of the other cylinder, through separate pipes, by the action of a steam engine or any other motive power. The two cylinders may be at any distance from each other. They are both fitted with pistons and piston rods, and the piston of one of these cylinders, which may be called the first cylinder, is acted upon by the steam engine or other motive power in the following manner, or by some other arrangement of mechanism. When the piston rod and piston of the first cylinder are put in motion, the water or liquid is forced to flow from one of the ends of this cylinder into that end of the second cylinder with which it is connected by its pipe, and the water or liquid in the other end of the second cylinder is made to flow back through the pipe attached to that end into the corresponding end of the first cylinder. Whenever motion is required to be given to the rudder the steam engine is started, and it gives motion to the piston of the first cylinder, and this motion is communicated to the piston of the second cylinder as before described, and this acts on the tiller, the motion given being in the direction and to the extent that may be desired. When the steam engine is stopped, the rudder will be held in the position into which it has been put, as the water will no longer circulate. Motion may be transferred from the piston rod of the second cylinder to the tiller in any suitable manner, but by preference the piston rod of this second cylinder is arranged to give motion to the tiller by a block sliding in a groove in a cap or cross head fixed on the end of the piston rod.

In place of using a moving piston in a fixed cylinder a cylinder moving on a fixed piston may be employed.

[Printed, 1s. 4d. Drawings.]

A.D. 1866, February 3.—N° 343.

LEEDS, EDWARD MONTAGU.—(*Provisional protection only.*)—"Improvements in securing the hatchways, skylights, and other "openings of steam and other ships or vessels." "I employ "sliding doors, shutters, or hatches to the hatchways, skylights, "or other openings, such shutters or hatches consisting of flat "plates of iron strengthened with angle iron, and made to move "on rollers in grooves, or on guides, by means of blocks or other "hauling gear, from side to side or across such hatchway, sky-"light, or other opening, such grooves or guides being composed "of angle or other iron securely fastened to the bulb irons or "deck beams of the ship. Frequently the deck beams cross the "hatchway, skylight, or opening, and then a separate shutter or "hatch is employed, the deck beams do not cross such hatchway "in each opening, but when this is not the case I introduce a "shifting beam or beams, or a fore and aft beam or girder, or a "rod or rods and guides, spanning such hatchway or opening "and supporting such door, shutter, or hatch, which is also made "to move on rollers in grooves or on guides by means of blocks "or other hauling gear. India-rubber or other packing may be "applied to close any crevices left by the sliding doors, shutters, "or hatches."

[Printed, 4d. No Drawings.]

A.D. 1866, February 5.—N° 352.

RUSSELL, JOHN.—(*Provisional protection only.*)—"Certain im-"provements in preventing oxidation as also the fouling of the "lower parts of iron-built ships, which said improvements are "also applicable for protecting the inside or hull portion of such "kind of ships, as well as the internal iron parts used for lining "or strengthening vessels principally constructed of wood." The invention consists, firstly, in the application of glass enamel to the outer plates of iron ships, as also to the keel, cut-water, and when convenient the stern post, and to other adjacent parts, such enamelling being effected in the ordinary way in which it has hitherto been commonly done for protecting the surfaces of

wrought and cast iron, viz., the covering of the plates or parts intended to be enamelled with powdered glass or silica, mixed with suitable fluxes and submitting the same to a sufficient heat to melt or vitrify such coating to make it adhere and flow smoothly over the surface of the plates or parts to which it has been applied.

Secondly, in the application of glass enamel to the inside of the plates or inner linings, ribs, framing, or strengthening parts of iron-built ships.

Thirdly, in the application of the like enamelled plates to the coating or covering of the hull or lower portion of timber-built ships.

Fourthly, in the application of the said enamelled plates to the protecting, wholly or partially, of the inside of ships built of wood, or partly of wood and partly of iron.

By the application of this enamel to the parts referred to, ships' bottoms will be preserved to a great extent, if not wholly, from fouling, even when remaining stationary for unloading and loading in warm climates; but should slight fouling take place the same will be found easy of removal.

[Printed, 4*d*. No Drawings.]

A.D. 1866, February 8.—N° 394.

DE BRIOU, Henry Edward Francis.—" Improved com- " positions for preserving metals from oxidation, corrosion, and " galvanic action; for protecting metals used in the construction " of ships against the destructive effects of sea water, and pre- " venting their fouling; for protecting wood from the attacks of " animalculæ and preserving wood from damp, rot, and decay; " for excluding damp from walls; and for use in submarine and " other telegraphy." " I take a composition made with vulca- " nized india-rubber, such as is described in the Specification of " a former Patent granted to me, and dated the 19th July 1864, " N° 1804, or made in accordance with a part of my present " invention, by the substitution of vegetable pitch or resin for " mineral pitch, and I render the composition fluid or semi-fluid " by compounding it with bi-sulphide of carbon." Two coats are necessary for ships' bottoms and other submerged substances, and when it is used for ships' bottoms poisonous compounds are incorporated with the outer coating, as follows:—" I take

" a substance formed by the decomposition of concentrated hydro-
" cyanic acid in dry chlorine (a kind of chloride of cyanogen),
" to which I add the cyanide of mercury and the ferrocyanide of
" copper in equal proportions, thus forming a compound which
" readily mixes with the vulcanized india-rubber composition.
" The proportions are:—Hydrocyanic acid and chlorine (chloride
" of cyanogen) 1 ounce; chlorocyanide of mercury 2 ounces;
" ferrocyanide of copper 2 ounces; vulcanized india-rubber com-
" position 25 lbs. This preparation is principally used for
" copper, zinc, the brasses and alloys. For iron I sometimes
" replace the cyanide of mercury by Prussian blue in the pro-
" portion of 3 ounces for 25 lbs. of vulcanized india-rubber
" composition.

" For submerged wood, copper, zinc, or iron, I mix together,—" Arsenite of copper 5 ounces; bi-cyanide of mercury 2 ounces; vulcanized india-rubber composition 25 lbs.

Felt used under the copper sheathing of ships, for roofing, or other purposes is rendered perfectly water-tight by being dipped into the fluid composition and made to pass between two cylinders. Woollen, cotton, silk, or other stuffs, linen, and canvass bands of every material can be rendered waterproof by being coated with the liquid composition. Wrapping paper, cardboard, and other kinds of paper are made waterproof by spreading a thin coat of the paint between two sheets, and passing them between hot cylinders.

[Printed, 4*d*. No Drawings.]

A.D. 1866, February 9.—N° 405.

DAVIS, George Daniel.—" Improvements in machinery for " working rudders." The object of these improvements is to give greater security and protection to the screw shaft and nut by which the rudder is turned, and also to enable the rudder to work with ease and steadiness. The nut is propelled along the slide, slotway, or guard irons by a rotary movement of the screw shaft or spindle which passes through the nut in the ordinary manner, and which forms the axis of an ordinary steering wheel. To the nut is connected chains or ropes; these chains or ropes are passed round rollers, blocks, or sheaves, and are then connected to a wheel segment or lever fixed on the rudder head, and

the desired motion is conveyed thereby to the rudder. An iron plate or lever may also be fixed to the nut, and the chain or ropes connected thereto and worked in a similar manner.

[Printed, 8d. Drawing.]

A.D. 1866, February 12.—N° 436.

NEWTON, ALFRED VINCENT.—(*A communication from John Ericsson.*)—" An improved construction of port stopper, applicable " to turret ships and land and floating batteries." This invention consists in the construction of the stopper in the form of a crank, also in its arrangement to turn about an upright or nearly upright axis, situated some distance within, or behind and opposite, or nearly so, to the centre of the port or embrasure, and further, in the attachment of the bearings in which the journals or pivots of the port stopper turn to supports which are detached from the wall of the turret, or other defensive structure, in the immediate neighbourhood of the port.

The bearings are made very shallow, so that in case of any slight disarrangement by the shot striking the port stopper, or by other means, the journals will not bind, and as the bearings are detached from the turret in the neighbourhood of the port, the shot striking near the port will not be likely to interfere with the operation of the port stopper.

[Printed, 8d. Drawing.

A.D. 1866, February 12.—N° 439.

WARREN, FREDERIC PELHAM.—" Improvements in the con- " struction of or arrangements for removing water from the " interiors of sea-going and other vessels, and in closing or " stopping leaks in such vessels." The inventor forms or constructs along the lowest convenient part or parts of the interior of the vessel, or communicating with such interior and running in the direction of the vessel's length, one or more channels or passages having openings provided with flap or other valves situated at convenient intervals, and opening from the interior of the vessel into the channel, channels, passage, or passages, in such manner as to prevent the return of water therefrom into the vessel. And, in order to prevent the passage of foreign matters from the vessel through the openings described, he forms each of them with a strainer or sieve, whereby such substances as might

stop or impede the action of the valves are effectually excluded. The channels or passages referred to communicate with suitable pumps, which, with the boilers, are placed at a higher level than the boilers used for working the vessel, so that in cases of any water finding its way into the hold and extinguishing the fires of the ordinary boilers, the pumping engine or engines may still be enabled to draw off the water through the openings and channels or passages described, and eject it from the vessel. Similar arrangements are applicable also to sailing vessels.

For stopping or closing leaks such as may arise by collision, shot holes, and otherwise, in iron, armour-plated, and other vessels, "I make use of a flexible waterproof substance (such as " a combination of felt and india-rubber) formed in sheets of con- " venient size, and having near to their edges, or in other posi- " tions at suitable intervals for holding the sheets, a number of " pneumatic holders partially contained in metallic or other " casings let into or attached to the sheets. The india-rubber or " other flexible substance constituting the surface or part of the " holder which is intended to be held against the vessel by the " formation of a vacuum beneath it is provided with a screw and " nut acting upon a washer, the under side of which is concave, " so that while allowing room for the drawing upward of the " central part of the flexible surface or part referred to it will at " the same time by the action of the nut upon the washer press " and hold its edges more closely into contact with the vessel. " For the purpose of stopping or closing leaks the sheets are " attached to the vessel externally by means of the holders, and " will be farther pressed and held against it by the water with- " out."

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1866, February 12.—N° 441.

LONGRIDGE, James Atkinson.—(*Provisional protection only.*) —" Improvements in apparatus for facilitating the working and " discharge of ordnance below the water level." "For discharg- " ing guns below water I make a port or hole in the side of the " ship at the depth desired, and fit and fix thereto a socket piece, " through which the muzzle of the gun is placed; this socket " piece is furnished with a sluice or slide valve fitted so that the " opening can be closed at pleasure when the muzzle of the gun

" is withdrawn. In addition to this sluice I furnish the gun itself
" (if it be a breech loader) with a sluice or valve disposed near
" the muzzle, which closes the muzzle of the gun when required.
" The bore of the gun at the muzzle has an enlarged recess which
" receives a thin disc with an india-rubber washer or packing,
" which makes the muzzle water-tight, so that when the gun is
" loaded and is pointed through the socket hole or port no water
" can enter. When the gun is fired the recoil causes the sluice
" or slide valve in the gun to be detached, and so closes the
" bore, so that water can only enter to that point. When the
" muzzle of the gun withdraws from the socket port the slide
" valve therein also falls and closes the port. Thus any water
" entering will only be the small quantity likely to enter as far
" as the inner slide valve and contained between it and the outer
" slide or valve. In muzzle-loading guns, instead of disposing
" the inner slide valve on the muzzle or chamber of the gun
" itself I dispose it in a short length of tube, which forms as it
" were a continuation of the gun, the inner end being provided
" with a socket to receive the muzzle of the gun. This separate
" piece and continuation of the gun barrel fits into and passes
" through the port socket as before described with reference to
" the gun muzzle, and is furnished with the recess to receive the
" closing disc presented to the external water. In loading the
" gun is drawn back from contact with this tube or barrel of
" continuation and so loaded at the muzzle. This tube, as also
" the gun in the former case, is drawn back from the socket port
" for the introduction of the closing disc, which is blown away
" every time of firing."

[Printed, 4*d*. No Drawings.]

A.D. 1866, February 13.—N° 456.

OGDEN, John, and ROGERS, Abraham.—(*Provisional protection only.*)—" Improved means or apparatus for the extinguish-
" ing of fires in steam vessels, mills, and other buildings in which
" steam is used." For this purpose one or more rows of pipes of any required diameter are laid and connected with a transverse row. The whole of these pipes communicate by a branch pipe with a steam pipe from the steam boiler. At intervals along the length of the row or rows of pipes valves are placed upon short branch pipes, having two or more separate apertures for the dis-

charge of steam, and where three apertures, for instance, are used it is preferred to give two of the apertures (one being placed on either side of the valve) a downward direction, whilst the third one has an upward direction, the valve being in this case what is known as a three-way valve. When raised half way, steam can pass through all three apertures, but when fully raised its upper seat closes the aperture, having an upward tendency. Outside the room or compartment, in a convenient position, are placed handles connected by means of rods and bell-crank levers to each valve.

[Printed, 4*d*. No Drawings.]

A.D. 1866, February 14.—N° 472.

NAPIER, Robert.—" Improvements in building ships of war." In order that the uppermost deck, or deck for working the ship and its supports, may offer as little obstruction as may be to the working of the guns on the deck below it, the said uppermost deck, in place of being supported by the frames and sides of the ship, is carried on beams resting chiefly on strong diagonal framing or supports, constructed intermediate of the length of the deck beams of the said uppermost deck, thus leaving the sides of the ship open above the gun deck and below the uppermost deck, the ribs or main frames and plating of the ship not rising at the sides above the gun deck. Temporary or moveable sides or bulwarks are in some cases employed to enclose the gun deck (or deck from which the guns are fought) when the ship is not cleared for action, whether that deck be such as would correspond with either the upper deck or main deck of an ordinary frigate or other war ship. It is preferred that the gun deck should be fitted with cupolas or turrets.

The supports for carrying the uppermost deck should consist chiefly of diagonal transverse framing rising up through the gun deck from below, and may be continuations of the transverse diagonal framings of the bulkheads or otherwise, and these should be so situated as not to interfere with or reduce the training and ranges of the several guns on the gun deck. In cases where one or more turrets or cupolas fight from each end of the ship's upper deck, it is of advantage to continue the ordinary ribs and frames and plating of the sides of the ship at those ends as high as the upper deck, so giving accommodation beneath such fighting deck

to the officers and crew at those parts. Should there be other turrets from the main deck, they may, where thought fit, be enclosed within moveable sides or bulwarks as before described, thus further increasing the accommodation; or they may be left without any such sides, in which case a longitudinal bridge or uppermost deck, of competent dimensions for working the ship and having the aforesaid supports, will pass over such gun deck turrets, and connect the fore and after parts of the ship and uppe decks from which the end turrets fight.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1866, February 16.—N° 502.

LINNINGTON, Adolphus Henry. — (*A communication from Peter Dinzey.*) — (*Provisional protection only.*)—" Improvements " in rudders and steering apparatus." " A hole is bored through " the entire length of the rudder reaching through from the " after part of the bottom of the rudder in a straight line barely " clear of the rudder head on deck. Immediately under the " rudder close up and fixed firmly on the stern post is an open " iron framework in the form of part of the arc of a circle and " two radii, the radii project out from the stern post on either " side as far as the rudder is intended to turn and the arc joins " them at the point of the inner part of the hole above described " in the bottom of the rudder. On the outer or after part of this " arc are a succession of correctly formed circular cogs reaching " along the whole arc. A rod perfectly round passes through the " hole in the rudder fitting it very exactly but not so closely as to " prevent its easy turning, extending from a little above the " rudder head on deck to the arc or frame under the rudder. " Around the lower end of this rod there are three or more cogs " cut which fit exactly into the cogs on the arc, and the shoulder " formed by the cogs so cut into the rod acts as a support for " the rod on the arc, the arc itself being further supported by a " bracket fixed on the stern post underneath. The rod passes " through a hole in the stern near to the hole through which the " rudder head goes, which takes an elliptical sweep equal to the " sweep of the rudder from side to side. The tiller on the rudder " head runs abaft and the upper end of the rod passes through " a hole in the tiller and going just clear of the rudder head, has " a wheel on the top around which a rope is passed two or three

" times and being carried to the sides of the ship and passed " through blocks is brought back and passed over a vertical " wheel of larger dimensions on the same axis with the steering " wheel. The steersman then when he turns the wheel turns the " vertical wheel which turns the rod, the cogs in the end of " which fitting closely into those on the arc cause the rudder to " move along at the same time. The rudder so moved by the " turning of the rod by means of the wheel on its upper end on " deck cannot in the slightest degree be moved by the action of " the waves, no matter how great their force, for the cogs on " the frame or arc fit in towards the centre of the rod, and more- " over the pressure of the rudder against the rod has the effect of " holding it more firmly in its place." The rod which turns the rudder along the arc may be readily drawn out from on deck, and the rudder worked independently of it, by means of the ordinary tiller rope and barrel, and furthermore the tiller rope may be used in conjunction with the rod and the arc. The rudder is also made in two separate halves from the rudder head inclusive to the bottom, the two grooves, the one for the rod through the rudder head, and the one for the cog rod, being first made and adjusted, and then the two halves screwed together. The arc or frame, if preferred, may be fixed on the stern post just above water, and just clear of the shoulder of the rudder, so that the rod descending obliquely from the rudder head on deck would be made to play along the arc by means of the cogs and would then descend into the hole of the rudder. Or the arc may be fixed on the stern post at any point between the shoulder and the bottom of the rudder; in that case the rudder will work within the radii of the arc, the part of the rudder above the arc being made to project out abaft the arc sufficiently to allow the rod to work on the after part of the arc as in the other cases.

The cog rod and cog segment may also be adapted to and combined with another description of rudder, namely, the double rudder, or rudder divided into two parts, the one part hinged on the other so as to present an angular surface to the water when turned on one side or the other.

The rudder is to be so hung by gudgeons as to be capable of being drawn up in the case of injury to any part of the apparatus.

[Printed, 4d. No Drawings.]

A.D. 1866, February 22.—N° 548.

WALKER, JOHN. — "Improvements in the construction of "vessels of war, forts, and batteries, and in mounting and working "guns therein."

The invention consists, firstly, in constructing those portions of the sides of vessels of war and those portions of forts and batteries where the port holes are situated as hereafter described. "Opposite each gun in the vessel I form a recess having the form "of a portion of a circle corresponding to the radius of the fore "part of the gun from the muzzle to the trunnions, and in this "recess I construct three port holes in the following manner:— "On the bottom I lay an iron plate of the desired thickness, and "in this plate I cut a hole or mortice to the proper shape to "receive the ends of several plates to form the divisions between "the port holes. These plates are rolled to the desired shape to "form the curved recess, and I let three or four of them, "according to the distance between the port holes, into the "mortice with their thick edges outwards; as these plates are "formed like the keystone of an arch they present the strongest "form against heavy shot. Over the port holes I place a top plate "corresponding exactly with the bottom plate, and fitting on "to the top end of the plates which divide the port holes. These "dividing plates have longitudinal grooves rolled so as to come "opposite each other to admit of bolts to draw the top and "bottom plates solidly on to the ends of the dividing plates; "these dividing plates for ships may be rolled thin in the middle, "leaving the bearings at each edge of the desired thickness." "I carry back or form recesses in the hull of the ship" "between "the sets of port holes and portions of circles to allow the covers "of the port holes to fall back and be out of the line of fire."

Secondly, in improved modes of mounting and working guns in vessels of war, forts, and batteries. "I first mount the gun "slide upon which the gun carriage is supported upon a shaft "free to revolve in a socket or tube carried through the deck or "floor and free to move in an elongated slot, the inner face of "which is circular at both ends." "In order to retain the gun "when trained I either use blocks or I apply a worm to work "into a worm wheel on the head of the shaft. The worm may "be used not only to retain the gun in the required position, but "the gun may also be trained by it. After firing the gun may be

" turned round for loading. In order to work guns in pairs and " to communicate an up-and-down motion to them, to allow of " one gun being raised for firing while the other is lowered and " protected to be loaded, I support the bottom of the pipe or " socket" "of one gun slide on a bed plate," "attached by " chains to a drum" "on or forming part of a horizontal shaft," " and on one side of that shaft, and I connect a platform" "to " the top of the socket. I cut away or leave a space in the deck " or floor to receive the platform. I make similar arrangements " and connect the pipe or socket of another gun slide on the op- " posite side of the same horizontal shaft." "Round the aper- " tures in the deck or floor I erect a short screen," "which when " the guns are in position for firing comes below the level of the " mouth thereof. One gun and apparatus balances the other, " and supposing them to be fitted amidship in, for instance, a " gunboat, the guns may be made to sweep the horizon." " Should two guns not be required, then a weight or weights to " balance one gun and apparatus must be connected to the hori- " zontal shaft." "Instead of running guns out for firing I " simply bring the muzzles up to or near the port holes or em- " brazures, and to protect them and to carry off the smoke " consequent on the discharge I place a tube on the outside of " the gun," "and run it out when the gun is ready for being " fired by sliding it along the gun. In constructing new guns I " flute the outside of the barrel, but for guns already constructed " I place longitudinal ribs in the inside of the tube, thus recesses " are formed through which the air is drawn and the place of " discharge ventilated on the firing of the gun."

[Printed, 10*d*. Drawing.]

A.D. 1866, February 23.—N° 560.

SAMUELSON, MARTIN. — (*Provisional protection only.*) — " Improvements in the construction of ships with a view to the " saving of life at sea." This invention relates to a peculiar construction and arrangement of parts of ships with a view to the saving of life at sea, and consists essentially in forming the poop, deck house, or main cabin of steamers and sailing vessels so that in the event of danger of the vessel's foundering, it may be readily unshipped and launched. For this purpose the poop, deck house, or main cabin is constructed in the form of a large barge, which

is fixed upon a cradle on the top of the deck, and is fastened thereto by sliding bolts carried by the poop, and entering fixed eyes in the deck. The bulwarks of the vessel at this part, as well as the poop itself, being made capable of being readily unshipped, the poop can be launched over the side with facility, and when launched will form a huge life buoy. Before launching, the water-closet pipes are removed, and masts, if any, are cut away level with the top of the poop or deck house, and the stump or lower part is released and allowed to fall into a well in the hold of the vessel. The poop is further provided with any suitable or well-known means for securing ventilation and for shipping a rudder, if required. Any suitable or well-known provision is also made for battening or making water-tight the companion doors and skylight windows of the poop or deck house.

[Printed, 4d. No Drawings.]

A.D. 1866, February 23.—N° 569.

RUSSELL, JOHN SCOTT.—(*Provisional protection only.*)— "Improvements in building ships of war." In order that the upper deck, and its supports, may offer as little obstruction as may be to the working of the guns on the gun deck, the upper deck, in place of being supported by the sides of the ship, is on beams, supported by pillars or supports situated intermediate of the length of the transverse deck beams, thus leaving the sides of the ship open above the gun deck. For this purpose the ribs or main frames of the ship do not, at the sides of the ship, rise above the gun deck, but, when desired, folding or moveable sides are employed to enclose the gun deck, when the ship is not cleared for action. These folding or moveable sides may be constructed in various ways, but it is preferred that they should be formed in sections, and framed and put together so as to fold out of the way and leave the space above the gun deck, and below the upper deck, open in all directions. The arrangements for placing and working the guns on the gun deck may be varied, and so may the constructions intended to protect the guns and men from the fire of an enemy; it is, however, preferred that the gun deck should be fitted with cupolas or turrets. The vertical supports or pillars for supporting the transverse beams of the upper deck centrally, or intermediate of their length, may with advantage in some cases spring from or be continuations of

transverse and longitudinal bulkheads or frames forming part of the main frame of the ship. In order that such supports for the upper deck placed in neutral spaces should extend as much as may be in directions longitudinally of the ship, each support should be formed of great strength by constructing a hollow upright shaft or column composed of trussed or other framing of iron or steel plated over or otherwise, and by bracketting out or extending such framing in order to receive and support the longitudinal and transverse beams on which the upper deck is constructed. When thus making the supports for the upper deck hollow they may be advantageously employed as shafts or ways between the upper deck and the lower parts of the ship, and be constructed accordingly. The upper deck is principally for working the ship, but it should be constructed with bulwarks and other fittings, as is the case with the upper decks of other war ships.

[Printed, 4*d*. No Drawings.]

A.D. 1866, February 24.—N° 574.

BULLEY, Thomas.—" Improvements in apparatus for cleaning " the bottoms of iron, steel, and other navigable vessels when " afloat and in motion or lying in a stream." This invention consists of a peculiarly formed double-action scraper, which is also fitted with a brush to facilitate the object in view, as well as to relieve a portion of the pressure of the scraper against the sides and bottom of the vessel operated upon, and consists of a plate of iron or steel of about 22 inches broad, about a foot of the front of which is formeu with a straight or nearly straight sharp cutting edge, the extreme ends of which edge are rounded off in a backwards direction fo about four inches. These rounded edges are curved outwards to form a kind of mould board on each side of the scraper. The body of the scraper is slightly arched and is rounded off at the back; this scraper is placed at an angle of about 35 degrees, and from near the centre of the under side of it extends two metal stays at a similar angle, which open out a little, and at the rear end are rivetted to a second scraper which is formed slightly hollow on the under side, and which at its outer ends is slightly curved inwards in plan. The oblique forward and back scrapers are further attached together by a pair of metal rods, the ends of which are rivetted to the back and front scrapers. These rods of, say, about 15 inches long are each

formed with an eye on the side for securing guy ropes to, as will be herein-after explained. Between the two bars last described a piece of timber is secured to the under side of the oblique scraper and the front ends of the bars, and at the rear is secured to the oblique stays by means of a pair of hooks and nuts, which hook clips the said oblique bars, and the shanks pass through the piece of timber and are secured thereto by means of nuts. To the under side of the piece of timber is secured a large stiff brush, the bristles of which project, say, about half an inch below a line drawn from the under side of the cutting edges of the oblique forward and after scrapers. The after scraper about the centre of its length is fitted with an eye bolt to receive a shackle pin and shackle for securing the after guy rope. The oblique forward scraper is also fitted with two eye bolts, one in rear of the other, for securing the forward guy rope. In rear of the eye bolt on the after scraper there is a certain piece of metal of about, say, four inches wide and about a foot long, which is placed at an angle of, say, about 45 degrees.

When it is desired to use the apparatus (which must be done when the ship is under weigh or lying in a stream), a line is bent on to the lower shackle on the front of the oblique scraper, a second line is then bent on to the shackle on the rear or after scraper, there a double line is bent on to the eye forward on the side of the stay which is uppermost when the front edge of the oblique scraper is towards the bow of the vessel, then take a small spar, fit to it a travelling block, reeve the line attached to the eye bolt on the oblique scraper through the block, then secure the upper end of the spar to the martingale, so that it may be immersed in the water to enable the scraper to pass under the vessel's bottom, then take a second spar and attach to the outer end thereof a block, through which carry the line attached to the eye bolt on the after scraper, and reeve it through the block on the end of the last-mentioned spar, then lash the spar to the end of the spanker boom, so that the leading block of the after guy rope may be well clear of the vessel, then haul taut the bow line, at the same time slacking away the stern line the required distance, then separate the double guy line attached to the eye on the side stay, say, fourteen or fifteen feet apart, then throw overboard, over the bows of the vessel, the scraper, then let go the bow line, and haul in the stern line until the scraper comes in contact with the vessel's bow, then let go about ten feet of the bow line, and haul

in a like quantity of the stern line, the men having hold of the double guy which is over the bulwarks. The men standing about 12 or 14 feet apart support the scraper by veering and hauling alternately on a line parallel with the horizon, or as near as conveniently may be. The double scraper with its intermediate brush is kept against the side or bottom of the vessel by means of the action of the water acting upon the oblique face of the fore scraper, and the water passing in rear thereof acting against the oblique curtain piece on the back of the after scraper. The object of the second eye bolt in rear of the first eye bolt on the front of the forward oblique scraper is to enable the forward guy rope to be attached thereto for the purpose of forcing the scraper under the counter of the vessel, as it is generally found difficult to operate upon that part of the hull of the vessel. The operation above described is repeated on the several portions of the bottom.

[Printed, 8*d*. Drawing.]

A.D. 1866, February 24.—N° 580.

WELCH, WILLIAM.—(*Provisional protection refused.*)—" Manu-" facturing and applying argillaceous, calcareous, silecious, and " metal composition cements." The invention has for its object " the manufacture of liquid and plastic cement compositions, and " relates also to the method of applying the same for ornamental " and other uses. The cements are compounded from varied " geological stratas made subsidiary by mechanical and other " means, or from substances artificially compacted in lieu thereof. " The metallic or other substances thus produced are by the aid " of mineral acids, liquids, and salts agglutinated into a plastic or " fluid consistency according to the purposes for which it is " intended, and may be applied in the usual forms of ordinary " paints or cements. The properties of the components are " permanent and literally indestructable and firmly adhering " to metals, stone, wood, or other surfaces without being dis" placed by concussive or vibratory action (as is the case with " ordinary cements when applied to non-absorbent bodies). The " compositions are intended to be used for general, building, and " other purposes, as also for imitations of stones, metals, &c., and " for plastic ornamental purposes, also for the coating and pre-" servation of iron and other substances exposed to marine uses, " whereby a waterproof insulatory protective surface is obtained " and where necessary coated with a granulated or fluid metallic

"compound (pure or mixed), whereby a system of galvanism "active, passive, or otherwise is produced for antifouling or "other purposes."

[Printed, 4d. No Drawings.]

A.D. 1866, March 1—N° 626.

SKINNER, James.—"Improvements in steering apparatus." The invention relates to apparatus for steering ships or vessels, and to improvements in the same, whereby the power of controlling the rudder is greatly increased, and augmented gradually as the rudder is moved over to either side, and consequently as the resistance of the water increases.

According to one mode of carrying out the invention "I affix "to the rudder had a crosshead, disc, or tiller of any convenient "shape or material, and I have a guide or guides of cast-iron or "other material, such guides being either straight or curved, "I prefer to make them of the form of an arc of a circle, so "placed as to be eccentric to the crosshead, disc, or tiller. "Attached to the crosshead, disc, or tiller will be one or more guide "blocks working on the said guides, and where the guides are "moved they will communicate the required motion to the "rudder. The guide blocks may be fitted with india-rubber or "spring buffers to receive any concussion, such as that caused by "a sea striking the rudder."

Or, "I substitute for the above-mentioned guides a link or "links of iron or other materials so placed that one end may "describe the arc represented by the guides in the former mode. "The guides or links may be kept in position and supported by "a framework and standards of cast-iron or other material, "or partly by one or more standards and partly by the rudder "head, and they may be moved by a screw and nut or nuts, or "by a worm and rack, in either of which cases an ordinary "steering wheel is intended to be used, or the guides or links "may be moved by hydraulic power, either with or without an "ordinary steering wheel."

[Printed, 8d. Drawing.]

A.D. 1866, March 1.—N° 632.

CAULFIELD, William Beare.—"Improvements in chains "and apparatus used for submarine purposes." In constructing

a chain the links or parts are made hollow, and by preference, of a cylindrical form, and in suitably short lengths; each link or length is made air and water tight; the several lengths or links are connected together by means of ball-and-socket or universal joints. By these means chains of any desired strength may be constructed, and of such weight, in respect to the weight of water displaced thereby, as the circumstances of their use in particular cases may require.

" In constructing beams to be used for submarine purposes I " make them of hollow tubes or vessels, and by preference each " beam is of a triangular form; the ends or angles, where the " parts come together and where the parts are joined one to the " other, are made air and water tight, and if desired such tubes " or vessels may be divided into separate cells or compartments. " By these means buoyant beams are produced possessing great " strength. Such girders are very conveniently employed in " raising sunken ships." When using flexible water and air proof bags for raising sunken vessels and other bodies, by attaching the bags immediately to the sunken vessel or body, in place of using bags which are closed in all parts as heretofore, each such vessel has an opening at its lower part, in order, as the vessel rises more and more towards the surface of the water, and is subject to less and less external pressure, some of the air contained in the vessel, and by which it is kept distended, may escape, so as to reduce the internal pressure to what is requisite for keeping the vessel distended.

[Printed, 10*d*. Drawing.]

A.D. 1866, March 2.—N° 638.

CLARK, William.—(*A communication from David Fernando Masnata.*)—" Improvements in steam vessels." This invention consists in an improved steam ship, in which the compartments that contain the passengers and cargo are supported above the water line, either by being located in stationary cylinders in the interior of the supporting and propelling wheels or screws, or by being located above and upon galleries attached to and supported by the projecting axles of the wheels or screws.

According to the first arrangement the vessel is, in its general form, a double drum or cylinder, that is to say, one cylinder within another. The inner cylinder, which constitutes the carrying capacity, is suspended on the shaft passing through its

axis and fixed to the larger surrounding drum. The outer drum constitutes the propeller, and it progresses in a rolling manner. The outer part, although in its outline of drum-like form, is divided into a number of compartments, some air-tight, and having the water excluded to afford the requisite buoyancy, and others open at the periphery to admit water, whereby the drum takes hold like the floats of a paddle. These compartments are formed by a series of disc partitions arranged parallel to each other from end to end, the several compartments between them being so disposed that the open ones act on the water in close succession, and make the propulsion continuous. The engines and cargo being disposed in the inner cylinder or drum, below the axial shaft, that cylinder is prevented turning round, while the engines which are connected by cranks with the shaft, rotate the outer drum, and propel the vessel. At one end of the outer drum the shaft projects only, whilst at the other the inner cylinder projects, that end of the outer drum being carried by a series of friction rollers arranged to project beyond the diameter of the inner cylinder. To this projecting end is fixed a gallery or frame-like structure, encircling the outer drum, and occupying a horizontal position. This may be said to be the deck or open space of the ship, and from which it is steered, rudders depending into the sea for that purpose; access is also had to the interior of the vessel (the interior cylinder) at the projecting end before-mentioned. The gallery or frame is supported on the shaft at the other end.

A modification of the above consists in making the outer drum surface with cavities and enclosed spaces, in the form of threads of a screw, around the outside; rotation is given to it in the manner already described, but by reason of the screw form of the vessel, the drums or cylinders progress in the direction of their axes instead of at right angles thereto, as described in the former arrangement. Instead of the engines being within the inner cylinder, as described, they may be disposed on the gallery or frame, and opposite to the projecting end of the inner cylinder, the motion being communicated by cranks on the projecting end of the shaft.

According to another modification "I dispense with the inner " cylinder, and constitute the gallery or surrounding frame the " only available part of the ship, and instead of one drum as " before two or more are mounted on the same frame. They are

" disposed with their axes parallel to each other, and furnished " with cranks at either end to receive the power of the engines " disposed in the gallery or surrounding structure."

Such vessels may also be made to travel on an ordinary railway track, or level ground, and on ice, by modifications of the surface of the outer wheels.

[Printed, 1*s.* 4*d.* Drawings.]

AD. 1866, March 7.—N° 692.

MACHIN, WILLIAM, and MACHIN, SAMUEL.—" An improved " apparatus for cleaning ships' sides and bottoms." This apparatus is such that it may be employed upon a ship during a voyage, or may be even used whilst she lies at anchor, if there be a sufficient tideway under her. Upon a hollow metal cylinder, of suitable size, tapered at each end, are affixed a certain number of metal flanges curved after the manner of a ship's screw; upon these flanges are placed either brushes or scrapers, or if needful both. Through the centre of the said hollow cylinder goes a strong metal pin, which is to form the axis upon which the cylinder is to revolve; the apparatus is then held in a suitable framework of iron.

In order to carry the invention into practice a line is passed under the keel of the ship forwards, by means of which the apparatus is brought under the ship's keel. Another line is attached to the apparatus, and also to the jib boom or other convenient forward part of the vessel, to prevent it from being carried aft. The motion of the ship will now cause the apparatus to revolve with considerable velocity, and being hollow it will have a tendency to rise to the surface of the water, but its position is from time to time regulated by means of the lines by which it is held, and in this manner it can be made to operate upon any parts of the ship's sides or bottom, under water, where it may be needed.

[Printed, 8*d.* Drawing.]

A.D. 1866, March 9.—N° 712.

FLEMING, WILLIAM.—(*Provisional protection only.*)—" Im- " proved arrangements for protecting hatchways in ships and " vessels." The improved arrangements consist in employing sheets of metal, such as lead or iron, over the hatches when shut down in a gale or storm. Where the hatches are openwork, no

preparation will be necessary, but in other cases where the hatches are constructed of solid work, such solid work must be pierced with holes for the purpose of the invention. In the sheets of metal above mentioned, and at the distance of about a foot apart, brass, copper, or other metal tubes are inserted, and secured by being screwed or otherwise, and have their upper ends turned downwards like a hook. These tubes must be made to open into the hatchway, by suitable and corresponding holes in the hatches, when they are constructed of solid work as above mentioned. The sheets of metal may be secured by fastenings so constructed as to be removeable at pleasure.

[Printed, 4*d*. No Drawings.]

A.D. 1866, March 10.—N° 734.

SIMONS, William.—(*Provisional protection only.*)—"Improvements in bolts to be used in the building or construction "of ships or vessels." This invention has reference to the application of a bolt of peculiar construction to be used in the structure or building of ships or vessels of the class known as composite; it also refers to the manufacture of the bolts themselves. In making such bolts they are first forged, and the screw thread is formed on them in the usual manner, and instead of leaving the body of the bolt smooth, as hitherto, it may be made rough by indentations, chisel blows, or otherwise, in order that the covering of yellow metal, copper, or other material in which they are cased may have a more firm and secure hold thereto. The covering of such bolts may be effected by forming a mould or moulds into which the bolt to be encased is placed, an annular space being left between the sand and the part of the bolt to be covered, into which the metal or material used for covering is poured. Or in lieu of casting the metallic covering on to the bolt a piece of metal has a hole bored in it of a diameter slightly less than the part or parts of the bolt to be covered, this piece of metal when bored being heated so as to expand it, at which time the bolt is placed therein, after which the covering is contracted by cooling, and remains firmly fixed to the bolt. In fastening together the various parts of a ship (in which timber and iron are jointly employed) by such bolts, the injurious corrosion caused by the contact and action of sea-water is effectually prevented.

[Printed, 4*d*. No Drawings.]

A.D. 1866, March 14.—N° 766.

MERRIAM, Scovil Sturgis.—"An improved submarine and "torpedo boat." The invention consists in the construction of a vessel for submarine purposes, of which the bottom or lower part consists of a heavy cast-iron bed plate, of the required shape, forming part of the vessel, to which the plating of the vessel of the other part of the hull is attached, the bed plate containing the necessary tanks for the water ballast. Also in the arrangement of suspended weights or ballast attached to ropes or chains, and capable of being brought above the lowest part of the bottom of the vessel or of being let down to any desirable depth. These weights, called "suspended ballast," are arranged near the ends of the vessel, and amidships, and are capable of being raised into recesses made in the vessel's bottom, or lowered to any depth below by means of windlasses. The ropes or cables on which these weights are suspended pass over suitable pulleys through air-tight tubes or channel ways to the windlasses, such pulleys and windlasses, as well as part of the gearing to work the windlasses, being situated in air-tight boxes, with only the shafts to operate, the windlasses passing through suitable stuffing boxes into the working compartment. By this arrangement the ropes or cables can freely pass through suitable large holes in the bottom of the vessel, without requiring any stuffing boxes for the ropes or cables to run through. When these weights are suspended some distance below the vessel they keep the same steady and upright in the water, and prevent her from rolling or pitching. When lowered, so as to rest on the bottom of the water bed, the vessel will be relieved of so much weight or ballast, and will be caused to rise and ascend by simply unwinding the ropes or cables without the necessity of forcing the water, which acts as part of the ballast, out of the water tanks, and by winding up the cables again the vessel will be made to descend again to the bottom.

Farther, in the arrangement of a bar at the bow of the vessel capable of having a torpedo or exploding shell attached to its end and operated from the inside of the vessel in such a manner as to move the bar either under the bottom of the vessel, for the purpose of attaching the torpedo or exploding shell, or to cause the end of it to project some distance forward of the vessel. The interior of the vessel is divided into several compartments, forming air chambers, for the purpose of containing compressed air to

supply the working compartment with fresh air when required, as well as to drive an engine to propel the vessel. Also in the manner of inclosing one or all the doors in the bottom of the vessel, by a chamber or box capable of being entered from the working floor and of being closed perfectly air-tight, to enable such door or doors to be opened without the necessity of filling the whole of the working compartment with the pressure of air necessary to resist the pressure of the water.

The propeller wheel for this vessel is supported in a swinging frame which is worked like a rudder, and being connected to the propeller shaft, by means of an universal joint, can be turned either to the right or to the left, operating therefore so as to serve at the same time as a rudder for steering the vessel. Near the propeller, at the after part of the vessel, and on each side near the centre line of the same, horizontal rudders are arranged for the purpose of regulating the descent or ascent of the vessel while in motion.

[Printed, 1*s*. Drawing.]

A.D. 1866, March 15.—N° 774.

ROBERTS, Martyn John.—(*Provisional protection only.*)— " Improvements in protecting iron ships and other submerged " structures from corrosion and fouling." " On the iron bottom, " either painted or clean, I attach zinc or other metal which is " electro-positive to iron by solder, bolts, or screws, care being " taken that the zinc or other metal electro-positive to iron has a " clean metallic junction or communication with the iron. A " little solder here and there will ensure this metallic junction, " which is essential to electric action. By this arrangement a " galvanic pair is formed, and the iron being electro-negative to " the zinc or other electro-positive metal is thus protected from " corrosion by sea water or acidulated solutions. I then coat the " zinc or other electro-positive metal on the side or face not in " contact with the iron with paint or varnish, which acts as a " mechanical aid in preserving the zinc; or a composition such as " varnish may be used, which will also act as an electric insulator " or separator between the zinc and the copper hereafter men- " tioned. Upon the zinc or other electro-positive metal I fasten " by wooden treenails or other means, which will not present a " metallic surface on the exterior face of the wood, wooden

" sheathing or planking diagonally or otherwise, and of a suf-
" ficient thickness to secure the copper sheathing nails without
" permitting the points of these nails to penetrate to the zinc or
" other metal electro-positive to copper. Sometimes I secure the
" wooden planking by bolts having two diameters, the smallest
" diameter being passed through the zinc and iron and screwed
" tight by a nut inside the ship, while the larger diameter passes
" through the planking, the shoulder at the point which separates
" the diameters resting on the zinc. The thickness of the plank-
" ing must be greater than the length of the larger diameter of
" the bolt, so that the head of the bolt may be sunk some distance
" into the planking, and covered with some suitable composition
" to insulate it from the copper. Upon the wooden planking I
" fasten a copper sheathing in the usual manner. Thus the iron
" ship is protected from corrosion galvanically by the zinc or other
" electro-positive metal, and if desired also mechanically by any
" paint on it. The zinc is protected from undue corrosion by its
" own coat of oxide, and also by the paint. The zinc is separated
" from the copper mechanically by the wood, and electrically by
" any insulating paint, and thus no galvanic pair is formed of the
" copper and zinc. The zinc is therefore not unduly wasted, and
" the copper not being electrically protected is corroded, so that
" marine animals and plants do not adhere to it."

[Printed, 4*d*. No Drawings.]

A.D. 1866, March 22.—N° 855.

MULLEY, William Robinson.—(*Provisional protection only*).—"Improvements in closing hatchway skylights of ships and "vessels." The invention consists in a mode of constructing and applying sliding shutters to such skylights. Along the top of central part of the engine-room or other hatchway of a ship or vessel is fixed a bar of I angle iron, which is fixed to the deck at its ends by uprights or knees of iron, and from this ridge bar parallel bars of like I angle iron descend or incline towards the deck. These bars are connected at their upper ends to the ridge bar and are framed together by flat iron bars by which a strong iron frame is formed. The inclined bars of I angle iron are so placed as to admit of the sashes opening between them. Shutters are arranged to slide between the inclined bars of I angle iron, and when the shutters are closed they are secured by bolts, which

pass into them through the lower flat bars of iron, which connect or frame together the inclined bars of I angle iron at their lower ends. On each side of the hatchway is formed a bench, in which the folding shutters are packed away in fine weather.

[Printed, 4*d*. No Drawings.]

A.D. 1866, March 22.—N° 856.

SYMONDS, Thomas Edward.—"Improvements in the con-" struction of ships and other vessels." In constructing a ship or vessel in order to obtain a more advantageous training and working of broadside guns, the ports or openings for such guns are recessed into the sides of the ship or vessel, and the two sides of each recessed port are inclined to each other, and such is the case in regard to the bottom and top of each recessed port. The sides and the bottom and top of each recessed port are armour-plated and constructed as strongly as the other or contiguous parts of the sides of the ship or vessel, the frames or ribs being formed accordingly, and, where desired, a slit or narrow passage is made through the top or on either or both sides of the port for the purpose of sighting, and the size of the actual opening through which the gun is pointed may be as small as possible. By thus recessing the portholes of broadside guns the guns are necessarily brought more inboard, and consequently the weights are carried in positions more suited to carrying and fighting heavy guns. At the same time guns so situated can by reason of the recessing of the ports be trained over or made to command a far greater range or arc than they could were a ship or vessel constructed with ordinary portholes.

[Printed, 1*s*. Drawing.]

A.D. 1866, March 24.—N° 879.

BOGGETT, William.—(*Provisional protection only.*)—"Im-" provements in the manufacture of metal bolts and rods for " shipbuilding and other purposes." The primary object of this invention is so to shape three segments of a rod, longitudinally, that when placed together and passed between rollers the pressure shall compress them inseparably together into a solid cylindrical bolt suitable for use in shipbuilding and other purposes. The inner segment or core being composed of iron or steel, the other two, or the enclosing segments, may be of copper. The inner core is

a nearly round bar slightly indented on two sides. The enveloping metal being forced into these indentations locks the parts together The core at both ends of the bolt is composed of copper or brass with a view to protect the iron from oxidation.

Rods of various shapes can in like manner be made as previously described, or with other combinations of metals.

[Printed, 6*d*. Drawing.]

A.D. 1866, March 29.—N° 910.

BONNEVILLE, HENRI ADRIEN.—(*A communication from Ernest Bazin.*)—"Improvements in recovering sunken ships or vessels, " and in apparatus relating thereto." This invention has for its object the recovery of sunken ships or vessels. It consists in employing for raising the sunken mass a kind of gigantic cast net, previously spread out upon the water by means of a flexible tube, filled with air, supporting its edges, and held together by pieces of rope, so that when these are cut the net sinks. The centre or head of this net passes through a sheet iron buoy, which is made to sink down on to the submerged ship by allowing a suitable quantity of water to enter it, and then lightened by pumping in air when the net has been made fast to it. This latter having enveloped the ship in its fold is with the ship brought to the surface. In order to raise the ship quite out of the water a raft composed of sheet iron tubes, connected together by suitable beams is passed under it, by allowing water to enter the tubes until they sink just under the ship and then pumping air into them till the wreck is quite emerged.

[Printed, 10*d*. Drawing.]

A.D. 1866, April 9.—N° 1008.

MACINTOSH, JOHN.—(*Provisional protection refused.*)—"Im- " provements in docks and apparatus connected therewith, parts " of which are applicable to floating structures." The object of the invention is the construction of temporary docks composed in part of flexible materials (such as sail cloth) forming a sort of bag or receptacle filled with water, the contents of which being forced into a smaller space, its altitude is increased and a means obtained of floating vessels.

The principle of the invention is likewise applicable to various other purposes, such as the raising or lowering of ships under various circumstances, the construction of double boats or vessels

connected by a flexible diaphragm, as a means of increasing their capacity for carrying goods or passengers, the crossing of rivers, the raising of ships, and such like structures.

[Printed, 4*d*. No Drawings.]

A.D. 1866, April 13.—N° 1044.

JAMES, HENRY BENSON.—" Improved adhesive compositions " for attaching copper or other sheathing to iron, wood, or other " ships or vessels." In preparing such composition, " I use by " preference a mixture consisting of one pound of resin, two " pounds of whiting, half a pound of litharge, with such an " amount of turpentine and linseed oil as may be necessary to " reduce the whole when well mixed and boiled together for about " five minutes to the consistency required."

Or, the inventor uses two pounds of solution, either of india-rubber or of gutta percha, one pound of red lead, and one and a half pounds of varnish or of varnish and mastic, the whole heated and made to the consistency of soft putty.

Or, one pound of red lead, two pounds of white lead, two pounds of whiting, and one pound of dryers, the whole mixed with linseed oil or turpentine, similarly heated.

Or, one pound of mastic, one pound of red lead, and two pounds of whiting, mixed with boiled oil and turpentine, and similarly heated.

In attaching sheathing, " I first apply a coating of oil and " paint to the surface to be covered. I then bend the sheathing " to the form required, and then apply coatings of linseed oil to " the sheathing and ship's or vessel's side. I then cover the " sheathing with the composition to the thickness by preference " of from one thirty-second to one-sixteenth of an inch, and " cause it to be forcibly pressed by machinery or otherwise against " the ship's or vessel's side. After the application of the sheath- " ing or at the time of such application it may be found neces- " sary to make use of a fire or fires whereby the sheathing " vessel's sides, and composition may be heated, the latter being " subsequently allowed to become dry or cool and set, and thus " to effectually secure the sheathing to the ship or vessel. By " experiments I have found that with compositions prepared " according to my invention no galvanic action takes place " between the iron of the vessel and the metal sheathing."

[Printed, 4*d*. No Drawings.]

A.D. 1866, April 17.—N° 1078.

BROOMAN, CLINTON EDGCUMBE.—(*A communication from Adolphe Guibert.*)—(*Provisional protection only.*)—" An improved " varnish for preserving wood and for protecting iron ships and " other metal work from oxydation and from fouling," and also for preserving wood from worms. It is prepared as follows: —Mix 25 parts by weight of galipot, 25 parts by weight of common resin, and 50 parts by weight of essence of turpentine. To 80 parts of this mixture, add 18 parts of sulphuret of copper reduced to an impalpable powder, and two parts of regulus of antimony, also in the state of impalpable powder.

" Sometimes I substitute for the turpentine petroleum, benzine, " and other mineral and vegetable oils."

[Printed, 4*d*. No Drawings.]

A.D. 1866, April 17.—N° 1081.

MAY, EDMUND REYNOLDS. — (*Provisional protection only.*) — " Improved apparatus for lowering and disengaging ships' boats, " part of which improvements is applicable to blocks employed " for other purposes." This invention consists of three parts, firstly, a means of instantaneously disengaging the gripes or fastenings from the ship's side; secondly, a means of lowering the boat rapidly independently of the tackles; thirdly, a means of disengaging the boat instantly at any period of the lowering.

To accomplish the first " I pass the lower end of the gripes over " a tumbler which is hinged freely to a stud by a pin through its " lower end; the upper end is held in its place by a disc fixed to " a spindle and revolving in a socket. This socket and the " tumbler stud are fixed to a plate which is bolted outside the " ship. The edge of the disc is notched to correspond with a " groove or notch in the side of the socket near the tumbler, and " the spindle passes through the socket to the inside of the ship; " to its inner end is fixed a lever by which the disc is turned. " To fix the gripe the disc is turned until its notch corresponds " with that in the socket; the tumbler, on which is placed the " eye or hook of the gripe, is then raised, its upper end placed in " the socket notch, and the disc turned notch upwards. The " tumbler is then secured in the socket until (when the boat is to " be disengaged) the disc is turned notch downwards; the tumbler

" then falls out and the gripe slides off it. If two gripes are
" used the levers on the inner ends of the spindles are connected
" by rods to a centre lever inside the ship, by which means both
" discs are turned together. The upper ends of the gripes are
" lashed in the usual manner.

" Secondly, the lowering of the boat is accomplished by using
" two chain or rope pendants, one passing through leading blocks
" or pulleys from a barrel placed midway between the davits,
" either vertically or horizontally, to a sheave in each davit head
" or lower tackle block. To the outer end of each of these pen-
" dants is shackled the disengaging block, which is very similar
" to that used for the gripes. The barrel is fitted with a strap
" break worked by a lever, by which the speed of the lowering is
" regulated, or a small line is fitted to wind on the barrel as the
" pendants unwind, this passes over a cleat, and is eased away by
" the man lowering. A bevil wheel, in which works a pinion
" turned by a winch handle, is also fitted to the barrel to facilitate
" winding up the pendants after the boat is lowered.

"Thirdly, the disengaging block is of metal with a score in its
" lower end extending about half-way up the block, thus leaving
" two cheeks or lugs. Through the upper or solid end of this
" block is passed a spindle having on one end a notched disc similar
" to that used for the gripes, and on the other a grooved wheel,
" which has a pin fixed in one part of its periphery. To one of
" the cheeks is fitted a bent tumbler moving freely on a pin; the
" other cheek is slotted up as far as the notch in the disc, and
" the bent end of the tumbler is passed up this slot and held
" there by the disc being turned with its notch upwards. To an
" eye in the upper end of each block is shackled the lowering
" pendant. The boat is fitted with slings in the usual manner,
" and to the slings are attached hooks having catch stops in them
" to prevent unhooking. A small barrel worked by a lever is
" fitted underneath the midship thwart, from which a line passes
" to each end of the boat through a guide pulley fixed to the
" bottom of the boat under the hooks in the slings; the ends of
" these lines are fitted with eyes which pass over the pin in the
" grooved wheel of the block when the boat is hooked on to the
" tumbler. The boat is hoisted up to the davits by the usual
" tackles, one hook in each sling being hooked to an eye in the
" lower tackle block. The pendants having been previously
" wound up, the other hook in the slings is hooked over the

" tumbler of the disengaging block; the line from the boat is " passed over the pin in the grooved wheel of each block, the " tackle block unhooked, and all is ready for lowering. By " moving the barrel lever in the boat the lines are pulled upon " and the discs in the blocks turned with their notches down- " wards, when their tumblers fall down, the hooks slip off them, " the lines at the same time slipping off the pins in the wheels; " the boat is thus instantly freed from the ship."

[Printed, 4*d*. No Drawings.]

A.D. 1866, April 19.—N° 1102.

HAMILTON, Robert.—(*A communication from James Beeston and John Spence.*)—" An improved composition for coating or " covering ships' bottoms and other surfaces subjected to the " action of sea water." With a view to prevent the corrosion of such surfaces and to preserve them clean and free from barnacles and seaweed, a composition is made of about 50 lbs. of tallow, 30 lbs. of white arsenic, and 10 lbs. of mercurial ointment.

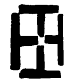
It may in some cases be sufficient to employ a well mixed composition of arsenic, metal mercury, and tallow for the purpose aforesaid.

These ingredients are to be boiled together and well stirred, so as to effect perfect admixture with each other, and the composition thus obtained is to be applied in a heated state to the surface to be protected by means of a brush.

[Printed, 4*d*. No Drawings.]

A.D. 1866, April 19.—N° 1106.

EVANS, Daniel.—" Improvements in the manufacture of " articles made of plates, sheets, or bars of wrought iron or of " steel." " In order to construct various articles of plates or " sheets of wrought iron or steel, where the parts of such plates " or sheets are brought together at angles, I either weld them to " each other at the angles or to ribs or bars placed at angles to " the plates or sheets, or I form flanges on the edges of the plates " or sheets and weld these flanges together; or I run into the " angles melted iron or steel, and by such means I avoid the use " of rivets in making the required joints." " In some cases, " such as when forming girders or other articles, where T and

" angle iron or steel, with or without sheets or plates, are em-" ployed, the edges of the parts to be joined are brought together " at angles, generally at right angles, as for instance thus 

" where four T angle irons are used, or thus  **where two " T irons and two plates are used.**

[Printed, 1s. 2d. Drawings.]

A.D. 1866, April 27.—N° 1195.

THOMPSON, Jacob Baynes.—(*Provisional protection only.*)— " Improvements in protecting iron ships from fouling and cor-" rosion." " Copper is the only substance that has been found " in practice to protect wooden ships from fouling, either as a " pure metal or in an alloy; this also it will do for iron ships, and " at the same time protect them from corrosion, if it be put on " water-tight, so that no part of the iron hull which is submerged " shall come in contact with the water. To attain this end I cover " the hull of an iron ship with a scaled sheathing of copper-coated " iron plates embedded on elastic felt, which is thoroughly per-" meated by a mixture of pitch and tar and firmly riveted to the " skin of the ship to a little above the load line. The skin to be " drilled partially through and tapped. The rivets to be made of " pieces of drawn copper rod screwed at one end to fit the tapped " holes; then the felt, after being properly punched, is slipped " over the rivets and bedded down, and then the plates over that " and firmly riveted. The plates must be of sufficient strength " to bed close to the ship on the felt without springing or buck-" ling. These plates I cover first with lead by heat on both sides, " and then with copper by electrolysis, but only on one side and " over the edges as far as they will overlap when in position. " The coating of lead is to protect the plates in case the copper " should be accidentally scrubbed off, lead being negative to " copper in sea-water. The sheets are coated with the lead in " the ordinary way, taking care that there be no more tin mixed " with the lead than is just sufficient to cause it to adhere to the " iron.

" It has been proposed to coat leaded iron plates by simply clean-" ing and immersing them in a sulphate of copper bath for the

" copper deposit, but by experience I have found such a deposit " not to adhere firmly, therefore to obtain a firmly adhering " coating after cleaning I dip the plates into a weak solution of " cyanide of mercury to slightly amalgamate the surface; then " give a thin deposit from a solution of cyanide of copper; then " thoroughly wash and deposit to the thickness required from a " sulphate of copper solution. Between these plates and the " iron skin of the vessel felted wool or other animal fibre saturated " with pitch and tar is introduced for bedding the plates upon, " making a thoroughly water-tight connection of the two surfaces, " preventing the iron skin of the ship from coming in contact " with the water. Plates of copper or of a suitable alloy of copper " may be put on in this simple manner, but of greater thickness " than ordinary sheathing in order that they may not spring " or buckle; it is however preferred to use sheet iron coated as " above explained by reason of the same being less in cost."

[Printed, *4d.* No Drawings.]

A.D. 1866, April 28.—N° 1209.

PIGGOTT, William Peter.—" Improvements in preventing " corrosion and fouling of iron ships." The invention relates to certain peculiar means for preventing the corrosion and fouling of iron ships or ships clad with iron without the aid of paints or other protective coatings, and consists in the application to such purposes of voltaic electricity. In order to prevent the corrosion of the internal and external portions of iron ships resulting from the action of sea water thereon " I cause a galvanic action to be " established between the iron of the ship and some other metal " which is electro-positive to iron (by preference zinc) and make " use of the sea water for exciting the battery thus formed. The " result is, that the zinc or electro-positive metal will be slowly " corroded or decomposed whilst the iron which is electro-negative " will be preserved.

" In carrying out this part of my invention I make one or more " plates, strips, bars, or blocks of zinc, and attach them either " directly to the iron surface of the ship, or place them in elec- " trical communication therewith by the aid of suitable conduc- " tors, in which latter case the zinc need not be in actual contact " with the iron, but in all cases the zinc should be so situate as " to enable it to be acted upon by the sea water. I prefer to use

"it in the form of one or more bars or strips secured directly to "the sides of the ship below the water line, or secured along the "keel, or to the stem and stern-post or other convenient part of "the ship. I also propose to insert pieces of zinc or other metal "which is electro-positive to iron in the brick or cement lining of "iron ships, so as to be in direct metallic contact with the iron; "or the zinc may be in electrical communication by means of con- "ductors with the inside or outside of the ship, in which case a "battery will be formed, the bilge water serving as the exciting "solution. By these simple means the costly process of sheath- "ing or mechanically protecting the iron surfaces from the cor- "roding action of the sea water is obviated.

In order to prevent the fouling of iron ships by the adhesion of "marine plants and animals thereto, I place the ship by the aid "of battery currents in one electrical condition and the water in "which it floats in the opposite electrical condition by the aid of "conductors from either end of the battery leading into the "water, the iron of the ship being at the same time connected "with the opposite pole of the battery, the relative electrical con- "ditions being reserved or changed from time to time at "pleasure,

"In carrying out this part of my invention I place a plate or "strip of zinc down the stern-post and another down the stem or "cutwater, both of which should be insulated from the iron of the "ship. By the arrangement of one or more ordinary batteries in "the ship, or by an arrangement of battery wherein the sea water "itself is used as the exciting medium, I cause two separate "currents of electricity to flow in opposite directions by the aid "of suitable insulated conductors from the zinc at one end of the "ship through the sea water to the iron at the other end, the "effect of which is not only to keep the bottom of the ship free "from marine plants and animals, but also to negative its polar "influence upon the compass. An ordinary galvanic battery may "be employed in conjunction with the said insulated plates or "strips of zinc, or the peculiar battery may be used which I have "described in the Specification of my Patent bearing date the "Twenty-eighth of August, One thousand eight hundred and sixty- "five, N° 2213. When the sea is used as the exciting agent of "the battery I construct a porous or perforated cell or chamber "at each end, or in any convenient part of the ship below the "water-line." This porous "chamber is to be lined with any

" suitable insulating material, and is to contain a plate of zinc or " other element which is electro-positive to iron, which element " should be in electrical communication with the iron in order to " close the electric circuit; by employing a similar cell containing " a block of carbon as well as a plate of zinc, and by connecting " the iron of the ship alternately with the zinc and the carbon, the " currents will be reversed."

[Printed, 4*d*. No Drawings.]

A.D. 1866, May 2.—N° 1247.

RAMSTEN, CARL HENRIK.—" Improvements in apparatus " used when lowering and releasing ships' boats." For these purposes two releasing hooks are used of the peculiar form hereafter described. One of these releasing hooks is used at each end of a boat, and the arrangement of the parts used with the hooks is such that immediately one of the hooks releases its hold on the hook of the lowering tackle, the releasing of the hook at the other end of the boat takes place also. The holding of the hooks depends on the weight of the boat suspended from them, and consequently immediately one or both ends of the boat is supported by the water the hooks release themselves from the lowering tackle. The hooks at the two ends of a boat are alike in construction and action, and each is formed in the following manner:—A short piece of metal having an eye or hole at each end is used; by the upper eye or hole it is attached to a short chain, the lower end of which is fixed to the bottom of the boat, whilst its upper end is attached to a ring by which the boat is usually lifted by the tackle, though under some circumstances the boat may be lifted by the hooks of the tackle engaging with the releasing hooks. The other end of the piece of metal is by its lower end attached to the upper end of another short chain which descends to the bottom of the boat, where the lower end of the chain passes through a fixed eye-bolt, and is then connected to a rod by which the chains attached to the lower ends of both the releasing hooks are connected together, and it is by reason of the two releasing hooks being thus connected that when one becomes released the other of necessity becomes released also, in consequence of its chain becoming slack.

In addition to the self-acting releasing power of the hooks, a hand releasing hook is employed, by preference, in the short chain

which descends from the releasing hook to connect it to the rod towards the after end of the boat, by which hand-releasing hook a man at that end of the boat can at any moment cause the two parts of which the short descending chain is composed to separate. The self-releasing hooks are each, in addition to the piece of metal above mentioned, composed of two other parts which are pin-jointed to each other, and the end of one of them is pin-jointed to the piece of metal; the free end of the other of the two parts folds down against the piece of metal, and its point or end is received into a recess on the edge of the piece of metal, or shields or projections may be fixed or formed on the piece of metal to receive the point or end of the folding part of the hook between them. There is a small bolt or catch to lock or hold the hook secure when the boat is ordinarily suspended, but which bolt or catch being attached to the davit by a cord is removed as soon as the boat begins to be lowered, and then the releasing hooks will retain their holding on the lowering tackle so long as the weight of the boat is pressing on the releasing hooks; but the moment the weight of the boat or of either end of the boat is supported by the water, the short descending chains above mentioned becoming slack, the hooks open and release themselves from the hooks of the lowering tackle. When the boat is hanging from the davits it is held in the ordinary gripes or lashings, the inner end of each of which is attached to a folding lever which turns on an axis fixed to the upright of the davit on to which the end or eye of the gripe is put. This hook is retained in its place by a folding stop, and is lashed by the fall of the lowering tackle. The folding lever has an ascending rod attached to it, and a short chain, the upper end of which is retained by a pin or bolt near the upper outer end of the davit, and such bolt or pin is withdrawn by a hook attached to a chain or cord attached to the boat, so that as the boat commences to descend the pin or bolt is withdrawn, and the folding lever released, and consequently the end of the grip also.

[Printed, 8*d*. Drawing.]

A.D. 1866, May 4.—N° 1262.

FURRELL, Frederick.—(*Provisional protection only.*)—" An " improved method of fixing rowlocks, crutches, and thowls to " all descriptions of boats and craft propelled by oars." The inventor takes two plates of metal or wood, or metal and wood

combined in an oblong form. These oblong plates are affixed together, at each end, by a cross plate of the same material, and of such form as not to interfere with the quarter revolution hereinafter described, and they are placed at a sufficient distance from each other to admit of the rowlocks, crutches, or thowls revolving between them. A kind of box will thus be formed, or the box may be cast in the shape and form above described.

A bar of iron or wood is then taken with one end somewhat thicker than the other, provided with holes, and of such length in proportion to the two plates that it can revolve between the two plates when fastened; the bar is then placed horizontally between the two plates, and revolves on a pin passed through the thick end of the same, and which said pin is affixed to the oblong plates, so that when the bar makes the required quarter revolution, one end of the bar is level with the top of the oblong plates.

The rowlock, crutch, or thowls to be fixed to the bar must be of such form that that side of the rowlock, crutch, or thowls pointing towards the bow of the boat when depressed, by the quarter revolution, shall be on a level with the top of the oblong plates.

The rowlock, crutch, or thowls of the form above described are fixed and secured to the bar through a hole provided for the purpose through the thicker end of the bar, and running at right angles with the surface of the bar by pins or screws, and which rowlock, crutch, or thowls can turn in the hole or be made fast as required.

To prevent the bar from being depressed and to support the pressure of the bar in rowing or in backing water, a sliding bolt is fixed to the thinner end of the bar underneath, which slides through a space cut through the cross plate nearest the said thinner end of the bar corresponding to the size of the moveable bolt, When the sliding bolt is withdrawn from the space in the cross plate, as above described, the rowlock, crutch, or thowls so affixed to the bar will revolve on the pin, whereby the rowlock, crutch, or thowls, at one-quarter revolution, when not required for use, will be carried into the space formed by the two plates, and again by the converse operation will be raised to the gunwale of the boat. The plates so affixed together are so let into the gunwale of the boat, and secured to the same, that when fixed the top of the two oblong plates and the gunwale present one level surface.

[Printed, 4*d*. No Drawings.]

A.D. 1866, May 8.—Nº 1322.

RITCHIE, JOSEPH HORATIO, junior.—"Improvements in "attaching wooden planking to iron ships and other vessels." The method employed is as follows:—Holes are punched or drilled through the bottom where bolts are required. Through these holes, from the inside, the counterpart holes in the plank can be very easily and correctly bored by putting the plank temporarily in its place for that purpose, or, if preferred, these holes may be marked and bored in the usual manner. In each of the holes through the iron bottom above mentioned is then inserted (covered with suitable cement) a short socket bolt having a head projecting about a quarter of an inch above the plate, covered with ebonite, and having a screw thread and nut on its inner end, the centre of the head being tapped to receive a screw bolt. These socket bolts having been firmly screwed up with their nuts and screws, the outside of the iron bottom of the ship or vessel receives a coating of suitable cement the same thickness as the projection of the heads of the socket bolts, to protect the plates of the skin of the ship or vessel from oxidation. The planking is then wrought and attached by means of the screw bolts above referred to, which enter into the above-mentioned screw socket of the socket bolts. These bolts have square or other conveniently formed heads, and they are covered with ebonite as far as the screw in the same manner as the heads of the socket bolts to protect them from oxidation. The heads of the bolts may be recessed an inch or more under the outer surface of the planking to admit of wood plugs being driven over them.

To ensure a perfect junction of the covered parts of the screw bolt and of the socket bolt a washer of soft vulcanized india-rubber may be attached to the head of the socket bolt, this soft washer being formed on or attached to the coating of ebonite.

In place of these bolts being of iron or steel insulated with ebonite, they may in some cases be of copper, yellow metal, or galvanized iron.

[Printed, 6*d*. Drawing.]

A.D. 1866, May 10.—Nº 1347.

THORNTON, THOMAS.—(*A communication from Digby Murray.*) "Improvements in raising and lowering ships' boats and other "weights, and in the apparatus used therefor." This invention,

which has for its object the lowering of boats from steamers or other vessels with perfect safety whilst the steamer or vessel is in motion consists in the peculiar construction of the lower block of the purchase used to lower the boat from the davit. The block is so arranged that the boat may be freed either on touching the water or at any desired distance therefrom. The block may be composed of any suitable material. In the body of the block there is a larger space left than in ordinary blocks between the sheaves to admit of a mortice being cut to allow a bolt to work up and down, which bolt acts as a key to the hook. The hook acts as a tumbler, which capsizes by its own weight when unkeyed, and it fits into the lower part of the block, the neck being straight and at right angles, or nearly so, to the curve of the hook. A chain or rope is attached to an eye or link in the head of the key, the upper part hooking to the upper block of the purchase or elsewhere, as may be determined, having metal eyes every two feet, so as to admit of its being shortened or otherwise according to the heel of the ship and the boat's height from the water. The intention being that the whole weight of the boat and men should be brought to bear on the chain just before the boat touches the water, resulting in the starting of the key and the immediate release of the boat. It is intended the key should work on anti-friction rollers. In lowering the boat it is considered better, though not essential, that the boat should be lowered by the ordinary falls until the chains or laniards attached to the keys are nearly taut, the falls are then lowered, the weight of the boat immediately comes on the chains, lifts the keys, the hooks capsize, and the boat is free. This block may be applied to several mechanical purposes.

It will be understood that the boat may be released at any point by having the laniard attached to the draw bolt rove through a block at the end of the davit, and made fast at the desired time, either on board or in the boat as may be preferred, so that the release is instantaneously effected.

[Printed, 8*d*. Drawings.]

A.D. 1866, May 14.—Nº 1372.

GERARD, WILLIAM.—(*Partly a communication from Andrew Gove.*)—" Improvements in fittings applicable to ships' decks to make tight joints around masts and other projections." For

this purpose the inventor attaches around the mast or other projection at a point just above the deck a metal hood of conical form. This hood is conveniently made in two halves, which can be applied around the mast or projection and drawn together with screws until the upper and smaller end of the hood tightly embraces the mast or projection, and an elastic packing of india-rubber being interposed a perfectly water-tight joint may be made. Before the hood is applied an india-rubber collar or a collar of other waterproof material is fixed to the deck all round the mast or projection; this is conveniently done by placing a metal ring on the edge of the collar and passing screws through the ring and collar into the deck. The other edge of the collar is fixed to the metal hood on the mast by screws passing through the lower edge of the hood, through the collar, and screwing into another metal ring below. Usually it is necessary that the two metal rings and the elastic collar should be made each in two parts to allow of their being placed around the mast or projection. When the collar is thus made it is preferred that it should be formed of two or more thicknesses cemented together, and the joints in the two thicknesses are placed as far apart as possible. The collar may be a short cylinder of india-rubber or elastic material, or it may consist of two or more broad flat rings laid the one on the other, and attached at their inner edges. In this way a joint may be made which will remain water-tight notwithstanding the working of the parts to which it is applied.

The metal hood completely encloses the elastic collar and preserves it from injury.

[Printed, 8*d*. Drawing.]

A.D. 1866, May 15.—Nº 1384.

HASELTINE, GEORGE.—(*A communication from Henry Albert Gouge.*)—" Improvements in the mode of and means for promo-" ting ventilation." There are two kinds of noxious air in a close apartment; one dense and heavy near the floor, known as carbonic acid gas; the other light and hot near the ceiling, known as exhausted air. The apparatus is designed to economically and surely remove both kinds.

The arrangement more particularly applicable to magazines, refrigerators, bank vaults, ship state rooms, and the like is designed to promote the ventilation by creating a current outside of

the same, into which current the impure air of the apartment is drawn and carried away, the same contrivance also lighting the apartment without heating it or incurring risk of fire.

There is a small chamber, containing a light, outside the apartment to be ventilated and lighted. The light heats and rarefies the air in this chamber and causes it to rise in a metal flue over it. The current of the heated air in the casing which surrounds this flue draws in the foul and heated air of the apartment through an opening formed for the purpose, and thus secures the desired ventilation. A cone over the light divides the current of air and prevents the light from being extinguished by the sudden closing of tight fitting doors, which would drive the air through the ventilator and down the flue into the chamber.

[Printed, 10*d*. Drawing.]

A.D. 1866, May 22.—N° 1437.

COLES, Cowper Phipps.—" Improvements in the construction " of vessels of war, forts, and other defences." The invention consists, first, in constructing and fitting a circular bulkhead or fixed turret round the lower part and turning apparatus of a revolving turret or gun platform, for the purpose of protecting the same. This circular bulkhead in the case of ships is supported upon the main deck, to which angle irons are secured, and the outside of the lower part of the circular bulkhead rests against these angle irons. The bulkhead reaches up to about the level of the upper deck, and between the bulkhead and the ring which connects the upper deck beams " I leave an annular space of about " two inches in width, more or less, into which I force wedges or " filling pieces. The angle irons before mentioned and these " wedges dispense with the necessity of employing bolts or other " fastenings for the circular bulkhead plating. Between the " circular bulkhead and the socket of the central pivot of the " revolving turret or platform I construct radial bars or arms " which hold and support the socket."

Secondly, in dispensing with the necessity of having a large hole in the upper deck of a vessel, or in the surface of a fort or other like defence to receive the base or lower part of the revolving turret or platform, by fitting the rollers upon which the turret or platform revolves below the upper deck or surface of the fort or like defence, so that sufficient of the rollers projects through

apertures in the upper deck for the turret to revolve upon. The rollers may be supported by carlings or small beams below the upper deck, or in suitable frames or otherwise. The apertures for the rollers and the central aperture for the socket are all the openings that require to be formed in the upper deck or structure of the fort or defence for the turret or platform.

[Printed, 10*d.* Drawing.]

A.D. 1866, May 28.—Nº 1486.

HENWOOD, Charles Frederic. — (*Provisional protection only.*)—" Improvements in ships' rudders and parts connected " therewith." The Inventor states that when balanced rudders are employed, or rudders which in order to facilitate the steering are made to project in front of as well as behind the rudder spindle, difficulty is experienced in obtaining sufficient strength; such rudders are usually of large size and supported with only two bearings, the upper or main bearing in the counter or hull of the vessel, and the lower bearing or step on a horn projecting beneath the rudder. In order to give additional support to the spindle, and to relieve the strain on the step or lower bearing thereof, he introduces a bearing or bearings intermediate of those above mentioned as heretofore employed; in this way he forms an intermediate bearing midway or thereabout of the height of the rudder, and for this purpose he cuts away the rudder at the point where the centre-bearing comes, from its leading edge back as far as the spindle, and in this way room is obtained for the bearing, which is carried on a horn or projection forged or formed on a rudder post. He also introduces an intermediate bearing just over the top of the rudder, and this bearing is carried in the same way by a horn or projection forged or formed on the rudder post. In most cases he employs both these intermediate bearings, but in vessels of shallow draft one of them may be omitted.

[Printed, 4*d.* No Drawings.]

A.D. 1866, May 29.—Nº 1498.

HEWITT, Francis. — " Improvements in rudders and stern " posts, and in connecting the same so as to allow of the ready " shipping and unshipping of the rudder from the deck." This invention has for its object certain improvements in the construction of rudders for navigable vessels, and in stern posts for the

same, and in the construction of the joints in which the rudder post turns, and which joints may also be provided with stops to limit the action of the rudder.

In applying this invention to an iron vessel the main piece or rudder post and blade of the rudder are formed in one piece, the main piece being formed so as to resemble a round rod or pillar placed on front of the rudder blade, and the lower end of the main piece of the rudder post extends below the blade to form a pivot, which takes into a round hole or bearing formed in the upper surface of the heel of the keel of the vessel immediately in rear f the stern post. The stern post is formed in one piece, having welded or formed thereon two or more braces which have vertical passages formed through them to allow the main piece or rudder post to pass through, and are slotted through at the after part to admit the blade of the rudder to pass through also when it is being shipped. It is preferred that the back of the stern post should be formed with a round hollow groove to receive the front of the main piece or rudder post to insure a good joint between the rudder and stern post. A mortice hole is formed through the rudder blade at the bearings or braces so as to allow the rudder to turn. The slotted bearing joints on the rudder post in front of the rudder blade may be enlarged at their sides, so as to form a vertical angular-sided recess, having a convex bottom, in which that portion of the blade of the rudder moves. In some cases it is preferred to enlarge the diameter of the main piece or rudder post at the parts that are encompassed by the joint bearings or braces, which are welded to or formed with the stern post, to compensate for wear and increase the strength of the main piece or rudder post. The rudder case is formed with a vertical fore and aft passage to allow the blade of the rudder to pass therethrough when being inserted or withdrawn through the rudder case, or the head of the main piece of the rudder may be socketted on to the lower portion thereof immediately above the upper joint, by which arrangement on removing the head of the main piece the rudder may be unshipped, without the necessity of taking the same inboard.

In applying this invention to a wood or composite vessel "I "prefer to use broader and extra gripping jaws in which the main "piece of the rudder turns, and to attach the said grip joint "pieces to the rudder post and dead woods of the vessel by "transverse bolts. Where the whole of the rudder post and

"blade of the rudder are formed in one piece, thus requiring a "slot or opening through the counter of the vessel, I use a pair "of flat plates placed edge to edge, and bolted to the deck to "cover the opening when the rudder is in position. The forward "ends of these plates are formed with semicircular perforations "so as to encompass the rudder post."

[Printed, 8*d*. Drawing.]

A.D. 1866, May 31.—Nº 1514.

HIRE, Henry William, and WHITE, John.—"Improvements in the construction of parts of ships and other vessels, "and in the mode or method of using or employing such parts "as a means of saving life at sea, and for other purposes." This invention consists in constructing certain parts of ships or other vessels in a novel manner, so that such parts may be utilized or employed when occasion requires or whenever desired, for the purpose of saving life at sea or elsewhere, or for transporting men and materials, such as landing passengers, troops, ordnance, and baggage; also for laying out bower and other anchors in case of need, and performing these and other operations with perfect safety, and without the risk of their being sunk in the event of shipping a sea whilst so employed.

For instance, "in sailing ships and screws or paddle steam "vessels instead of the bridge being merely a platform constructed "of planks, and used for crossing from side to side, or for passing forward and aft, or communicating with the poop or forecastle, we construct it in the form of a lifeboat, with the "necessary amount of buoyancy and stability, which we obtain "by combining the well-known principle upon which Lamb and "White's lifeboats (Patent 135, dated January 20, 1862) are "built, videlicet, with end compartments and side-water-cases "divided by bulkheads." For the purpose of launching these bridges a mounted, hinged, or vibrating framework is provided upon which they may be supported; this frame being generally supported upon a bearing or axis in the centre, and upon stanchions at the ends. Upon their being relieved at one end the framework or launching ways will be lowered to the required declivity, and the lifeboat bridge be launched without trouble. The framework and launching ways can be suspended at either end, if preferable, so that the opposite end to that which is hinged is allowed to fall, and permit the bridge to slide off readily.

" Instead of erecting, setting up, and fitting lifeboast upon " standards, and at a convenient elevation from the deck, one or " more lifeboats may be fitted into suitable channels, recesses, or " spaces formed in a raised poop or forecastle, or in any deck- " house or other structure upon the deck of the ship, so that such " boat or boats may form a moveable part of any such structure, " and by being grated over or fitted with gratings or other flush " or sunken covering or decking be made either part of a roo " deck, or promenade, or form a bridge or standing place, and " when required for use they may be hauled out horizontally by " means of tackles or by the necessary inclination being given to " the frame by which they are ordinarily supported; or, in case " of the ship sinking, they will be readily disengaged, and float " out with their freight or load."

[Printed, 1s. Drawings.]

A.D. 1866, June 4.—N° 1544.

HENDERSON, Constantine. — " Improvements in girders " manufactured in iron, steel, or otherwise combined with timber." The invention relates to certain peculiar methods of constructing girders which are applicable to the formation of roadways, bridges, and railway works, tunnels, viaducts, piers, fire-proof floors, subways, roofs, archways, lintels over all descriptions of openings in ordinary buildings, supporting walls over shop fronts, and in every other kind of construction where weight has to be carried, and the said girders are also adaptable to the construction of ships and the various parts thereof.

The peculiar and improved modes of constructing girders on the principle referred to in the Inventor's Patent, N° 335, and dated the 7th day of February 1865, and as herein described, consist of a web or webs (with or without flanges) and abutments or skewbacks used in conjunction with an arch or arches of brick, stone, tile, timber, or other material, the arch or arches being formed between the abutments or skewbacks forming part of the girders. These abutments or skewbacks are either cast or otherwise manufactured in metal; in some instances, however, the abutments may be formed of timber, or of timber and metal together, and may be solid or hollow. The inner side of the abutments or skewbacks are formed to the particular angle to suit the radius of the intended arch or arches that are constructed within

the span or space between the two abutments, and in the centre, or sometimes in other parts of the said skewbacks or abutments, a tenon or slot is formed to receive the ends of the webs above mentioned. In some instances the abutment is formed in cast or otherwise manufactured metal in the shape of a shoe or plate, the lower side being horizontal, and the inner side made to incline to an angle suitable to the arch or arches which abut on to the face of this shoe. The web of the girder may be of rolled or cast metal, and may sometimes be made in timber in conjunction with hoop iron bands or otherwise strengthened by braces running parallel therewith, but in common the web will be of metal, the form thereof usually being that of a longitudinal flitch or plank, and the ends thereof are either dovetailed or turned up to fit the tenons or slots in the abutments or skewbacks, or they are formed to suit such other mode of fixing as the occasion may require. The skewbacks or other abutments being in position, the web is secured to them by dropping or placing the dovetailed or turned-up ends of the web into the tenons or slots of the skewbacks, or they are secured together by such other means as may appear best suited to the particular occasion; the arch or arches may then be constructed within the span or space between the abutments and built up clear of the top of the web, which is never subject to vertical pressure, but the weight or pressure is firmly supported or carried by the arches on either side. In order to obtain the necessary length of the web where the spans are of considerable length, as will frequently be the case in bridge building, the web will be formed by one or more plates or pieces of iron, steel, or other materials placed together, bolted, and screwed together in the usual way, or connected in some other manner. These girders are also particularly applicable to the formation and construction of fire-proof floors, and the only additional arrangement necessary in constructing the floors is simply the elongation or widening out of the skewbacks or abutments before mentioned.

According to another method, in lieu of the ordinary girder used for building and other purposes, an arch is prepared with perforated bricks, stone, iron, timber, or other suitable materials, and in each brick or portion of other material which forms the arch, a perforation is made to allow of a straight line of iron chain, rod, or twisted metal wire to pass through the entire arch when formed, and this chain, rod, or twisted metal wire is securely fixed to the iron skewbacks or abutments, and by this method or con-

struction, as in all other cases, the iron chain, rod, or twisted metal wire is never allowed to take the burden of the vertical pressure, but its entire duty is that of tension.

[Printed, 1s. 2d. Drawings.]

A.D. 1866, June 21.—N° 1659.

FORGIE, William, and Thornton, John.—"Improvements "in the construction of life boats, and in sails for the same, for "the purpose of saving life at sea." The improvements relate, first, to the application of water-proof tubes or pipings filled with broken or granulated cork in the construction of life boats, either placed or arranged in the interior, or employed in the construction of the hull of a boat, or in combination with india-rubber, gutta percha, wickerwork, wood, or other suitable material. The water-proof tubes or pipings containing cork form a considerable number of separate chambers or air-tight compartments, which impart great buoyancy to life boats constructed or partly constructed therewith. The inventors construct life boats of this character with a gunwale worked outside the ordinary gunwale, and formed of solid cork alone, or in combination with other buoyant materials.

Secondly, to the construction and application of a hood or sail to boats for saving life at sea; this hood or sail is fixed or placed on to the fore part or stem of the boat, extending round and above the gunwale to about one-third of the length of the boat, and consists of a number of separate air-tight compartments combined together in the form of a hood. These separate air-tight compartments forming the hood or sail may be made of thin metal, wood, gutta percha, india-rubber, water-proof fabric, or other suitable materials, and the compartments may, if desired, be filled with any light buoyant materials, by preference granulated cork.

The form and position of the hood or sail causes the boat to be driven before the wind, and should it be cast over, the buoyancy of the hood or sail, together with the superficial gunwale, will immediately cause it to right itself again. Apertures are formed in the boat for discharging any water that may be shipped in a rough sea, or otherwise.

[Printed, 10d. Drawing.]

A.D. 1866, June 21.—N° 1660.

HART, LAWRENCE.—" Improvements in the construction of " rafts for saving life at sea and for other purposes." The inventor proposes to construct a raft by means of a number of buoyant cylinders, or other suitably shaped buoyant bodies, composed of cork covered with oilcloth or waterproof canvas, wood, hollow metal, inflated india-rubber, gutta percha, leather, hides, or other suitable material, or of any other light or highly buoyant substance. These cylinders or buoyant bodies are in some cases hooped or banded and strapped, in order to strengthen them, and are also provided with keels. In constructing the raft, the cylinders are placed side by side on a steadying frame or gauge, lashed if necessary to the deck of the ship or other place whence the raft is to be launched, whereby the exact positions of the parts are at once ascertained, and by hooking them to the said frame or gauge they will be prevented from being displaced by the violent motion or action of the waves. Bracket or check pieces are secured to the sides of the cylinders, which abut against each other when in position, and are kept in their places by means of hasps and staples, or by other convenient fastenings, The cylinders are further secured laterally by means of metal rods, which severally pass transversely through them, and are provided with rings or handles on their ends, which rings or handles are secured to each other by lashing, and are also used for carrying the cylinders. On the top of each cylinder, when convenient, there is secured a flat narrow footway or platform extending the entire length, or nearly so, of the same, and the intermediate spaces between these platforms are overlaid with trellis-work or perforated boards, hinged on to the sides of the platforms, for the purpose of forming a commodious deck, the perforations being intended to let out any water that may be shipped. Upon the cylinders, thus combined together, there is secured by means of bolts and pins a rectangular frame, which constitutes the bulwarks of the raft, and which may be provided with doors for the facility of ingress and egress, and with rowlocks for the reception of oars. One or more rudders are shipped into one or both ends of the centre or other cylinders, and connected by a joint to the bulwarks for the purpose of steering the raft, and a mast and sails are provided for assisting its progress through the water, the mast being secured by clasps and

staples to a framing forming part of the bulwarks, and extending longitudinally and transversely over the entire raft, thereby dividing it into four separate compartments. Casks or other receptacles for food and water are secured to the centre part of the raft, and round the inside of the bulwark seats and safety straps are provided for the comfort and security of the passengers. The entire raft having been put together ready for launching, the steadying frame or gauge is unlashed from the ship's deck, and either disconnected from the raft or launched with it.

[Printed, 10*d.* Drawing.]

A.D. 1866, June 26.—N° 1705.

BEECHING, Charles.—(*Provisional protection only.*)—" Improvements in ships or other navigable vessels to be employed " in conveying liquid cargoes." For this purpose it is proposed to construct a vessel with longitudinal and transverse partitions, thereby dividing the vessel into a number of compartments, each of which is provided with a suitable valve or door in such manner that when the doors or valves are closed, each compartment shall be hermetically sealed against the entrance of water or other liquid cargo from the adjoining compartments; but when it is desired to fill or empty the ship or other vessel of its contents the doors or valves are then opened, so that free communication may be afforded between some or all of the compartments, and by means of syphon or other suitable apparatus, applied to one or more of the compartments, the water or other liquid cargo is supplied to the vessel or drawn off therefrom, flowing into such compartment or compartments through the doors or valves until the vessel is entirely filled or emptied. The vessel is also constructed with a perforated or reticulated false deck a short distance below the ordinary deck, and the various divisions and the sides and bottom of the vessel are securely braced together by suitable tie rods or braces, in such manner that the vessel shall not be injured by its rolling or pitching in disturbed water.

If desired a screw or other suitable means may be provided to propel the vessel.

[Printed, 4*d.* No Drawings.]

A.D. 1866, June 28.—N° 1723.

DAWSON, David, DAWSON, Dan, and BROADBENT, Thomas.—" Improved means of and apparatus for extinguish-

"ing fire in steam ships, mills, manufactories, and other build-"ings." This invention consists in the employment of the nitrogen and carbonic acid gases, or the products of combustion of coal or other fuel proceeding from fires or furnaces of steam boilers, or other furnaces, for the purpose of extinguishing fire in steam ships, mills, manufactories, or other buildings.

"We fix either into the flue or chimney of a boiler or other "furnace a conical tube, the small end projecting outward in any "convenient direction, and we (by preference) introduce, about "centrally, within this tube a steam jet or steam pipe with its "end directed for the steam to blow out at the smaller end of "the conical tube, and thereby to produce a draught or current "which will draw out from the flue the gases or products of "combustion, and also force them through pipes or flues to the "place where a fire exists and is required to be extinguished: "or instead of a steam jet a fan may be employed for this pur-"pose; also (by preference) we force these gases or products "through a chamber in which is a shower or series of jets of "cold water for the purpose of condensing the steam (when a "steam jet is used), and also for cooling the said gases or pro-"ducts before applying them to the purposes intended; or these "gases or products of combustion may be employed without "passing them through the cooling chamber."

"In carrying this invention into practical operation, or in "applying it to steam ships, mills, manufactories, or other build-"ings where there are fires or furnaces in connection or near at "hand to produce the herein-before named gases or products of "combustion, we make arrangements according to the particular "circumstances of the case."

[Printed, 6*d*. Drawing.]

A.D. 1866, July 9.—N° 1805.

NEWTON, ALFRED VINCENT.—(*A communication from Charles James Eames.*)—(*Provisional protection only.*)—"An improved "compound for coating ships' bottoms and other surfaces." This composition, which is particularly intended for coating ships' bottoms, can be used for coating woodwork or iron of any description which may be exposed to the action of salt or fresh water, and which is liable to become foul or perforated by worms. It consists of asphaltum, naphtha, heavy oil from gas tar or coal tar, sulphate

of copper, white arsenic, and creosote, mixed together in about the following proportions:—Asphaltum, 7 lbs.; naphtha, 4 lbs.; heavy oil, ½ lb.; sulphate of copper, ¼ lb.; white arsenic, ¼ lb.; creosote, 2 ounces. The asphaltum is melted by heat, and to it is added enough naphtha to give the mixture the consistency of paint when cool; after this mixture is cooled a preparation of the remaining ingredients is added. These are mixed together as follows:—The sulphate of copper is pulverized and heated until it is quite free from its water of crystallization, to this is added an equal quantity by weight of white arsenic of commerce and also enough creosote to form a paste; the heavy oil is then added, and the mixture is ground until it becomes quite smooth, after which naphtha is added sufficiently to make the mixture liquid. The preparation thus obtained is stirred into the first mixture, and when both are thoroughly combined the compound is ready for use.

[Printed; 4*d*. No Drawings.]

A.D. 1866, July 12.—N° 1833.

GALLAFENT, DANIEL.—(*Provisional protection only.*)—" Improvements in apparatus for transmitting motion to the rudders " of ships and other vessels." " From the rudder head I either " extend an arm having a groove in it in which a slide moves, or " I fit such radial arm to move through the head of the rudder, " to which it is accurately fitted; this sliding radial arm, or the " slide moving in the groove thereof, I connect by a pin or stud " with the short end of a lever forming the tiller, disposed imme- " diately above the rudder head, the fulcrum of the said lever " tiller being disposed so that the connecting pin or stud comes " very near the rudder head when the rudder is in line with the " keel, consequently the leverage of the sliding radial arm is very " slight at the time, while on the tiller being moved a-port or " starboard the radial arm is extended and the leverage thereof " increased according to the greater extent to which the tiller is " moved to port or starboard, and as is required to overcome the " resistance of the rudder. The tiller mentioned may be actuated " directly by hand or by chains from a steering wheel as usual. " The extending radial arm from the rudder head, or the slide " moving therein before mentioned, may move in chases or guides " across the breadth of the ship, and so be extended or moved

" further from the rudder head, the leverage being increased the " further it is traversed in either direction from the middle of the " ship; when so fitted I connect the part sliding in the chase " across the breadth of the ship by chains to the barrel on the " steering wheel axle, which chains are led thereto over pulleys as " usual."

[Printed, 4d. No Drawings.]

A.D. 1866, July 13.—N° 1846.

PRINCE, Alexander.—(*A communication from George Palmer Ball.*)—" Improvements in the means of preserving timber from " decay." This invention consists, firstly, in the immersion of the timber in crude petroleum until complete saturation is effected. In order to accomplish this the timber is placed in a suitable vessel or receptacle, and the air is exhausted therefrom. The crude petroleum is then conveyed into the vessel or receptacle, and is caused to penetrate, by atmospheric pressure, into every pore or interstice of the woody fibre, the effect being to thoroughly preserve the wood from decay.

The invention is also applicable to the preservation of ships and vessels from decay or dry rot. For this purpose some cheap mineral paint or pigment should be mixed with crude petroleum, and the mixture may then be applied as a coating to the bottoms of wooden ships or vessels before the application of the metallic sheathing.

Timber for buildings may be similarly treated, and wood for use in the construction of piers, bridges, or embankments may be rendered very durable by the treatment described, the attacks of insects being thereby entirely obviated.

[Printed, 4d. No Drawings.]

A.D. 1866, July 21.—N° 1891.

SMITH, Hugh.—" Improvements in rivetting, boring, and other " apparatus and arrangements to be used in constructing ships, " bridges, boilers, and other metallic structures." The invention has principally for its objects to methodise, to expedite, to cheapen, and generally to improve the constructive operations in making hips, bridges, boilers, and other metallic structures. In order to illustrate the invention, the case of rivetting the plates of an iron ship to the frames and to each other is taken, the frames and plates being assumed to be in position.

An important feature of the invention consists in providing frames or supports for the rivetting apparatus, and in arranging for the progressive movement of the apparatus as the work proceeds.

There are, in one modification, four principal frame bars or frame tubes situated in transverse vertical planes, but bent in those planes approximately to the transverse sectional contour of the ship's side. Two of these fixed frame bars (as they may be termed) are outside, and the other two are inside, and they are held by links jointed or fixed to shoes, which are bolted or otherwise fixed upon the ship's frames or plates. A movable frame is carried upon the outer pair of fixed frame bars, and consists of one or more horizontal bars or tubes held by two carriages, which latter are fitted, with or without rollers, to run or slide on the fixed frame bars, the rollers or corresponding parts being acted on by springs so as to grip the bars. In order to adjust the movable frame on the fixed frame bars, each of the latter has a chain fixed to its top and bottom ends, and the two chains pass round barrels or pulleys on the carriages, the barrels being fitted with gearing so that they can be actuated either simultaneously or independently. By turning the barrels the moveable frame can be warped towards either end of the fixed frame bars. On the horizontal bars of the movable frame there is mounted, so as to slide thereon, a holder or slide, which carries a small steam or compressed air hammer for effecting the rivetting operation. The hammer cylinder has formed on it a projecting zone, which is shaped spherically to fit a corresponding spherically shaped seat formed in the slide, and in a movable cap, which last secures the cylinder in its place, and may be screwed up to fix the cylinder in any angular position that may be required, and that the spherical form of the parts admits of. The piston, piston rod, and hammer head are rigidly united, and the valve, which is by preference of the cylindrical class in use with ordinary steam hammers, is actuated by means of adjustable tappet pieces on rods fixed to a crosshead on the piston rod, the tappets acting on levers on a rocking spindle, having on it a lever connected to the valve spindle. Springs may be applied to these details to mitigate the concussions. In other respects the hammer details are like those of ordinary double-acting steam hammers, the steam or compressed air being of course supplied by means of flexible or jointed tubing. The rivetting apparatus is shifted on its supports by means of racks and pinions, or by barrels or pulley

and chain gear, or, as is preferred, by means of screws. In connection with the hammering apparatus there is attached to the movable frame a platform for the attendant worker or workers to stand on, such platform being adjustable. To act in concert with the hammering apparatus carried by the outer fixed frame bars there is carried on the inner fixed frame bars a movable frame consisting of one or more horizontal bars or tubes, on which is supported the dolly or holder up. This dolly consists simply of a massive bar made to bear up against the inner end of the rivet, and opposite the blows of the hammer, having spiral blade or rubber springs and adjusting screws applied to it in any convenient way to obtain the requisite pressure, and being by preference arranged with its weight equally on opposite sides of its supporting tube. Or the requisite elastic opposing pressure may be obtained by means of steam, air, or other elastic fluid. In general the tube will take the strain directly, but in some cases the dolly will require to be carried by a lever, whilst in other cases a simple weight suspended by suitable tackling running on rollers above may be substituted for the spring dolly; or the holding up may be performed by hand in the ordinary way. The dolly may be shifted by means similar to those already described as applied to the rivetting apparatus. The dolly tube or support carries an adjustable platform for the attendant worker who has to put in the rivets and to place the dolly against them. When the rivetting or other work in which the apparatus is used is done in the portion of the ship's side between the fixed frame bars, one outer bar and one inner bar are shifted a stage further on, and the hammering and dolly apparatus are also moved. The links connecting the frame bars to the ship frames or plates are by preference disposed angularly to enable the hammer to act quite up to the centre line of the shoes, and when shifting a stage the links of the bar which is not shifted are turned over in the other angular direction to admit of the new stage of rivetting being commenced where the preceding one left off.

In making some structures, such, for example, as bridge beams or girders, or boilers, the frames for carrying the rivetting or other apparatus may be fixed to the structure itself, or not, as may be convenient; thus the structure may be supported above the ground, whilst the frames for the rivetting apparatus may be upon a carriage or slide beneath, which carriage or slide can be traversed along as the work progresses. Instead of adjusting the

movable frame or frames by warping in the manner above indicated, the adjustment may be effected by means of chains wound on barrels situated at the end or ends of the fixed frames, or differential pulleys or rack-and-pinion gear may be used for the same purpose. The racks may be applied to or formed on the frame bars or tubes, and partially or entirely round them, the pinions being shaped to suit the racks. The fixed frame bars, described as being placed in vertical planes, may be arranged horizontally or otherwise, the movable frames having their position changed correspondingly, and being in general at right angles to the fixed frames. The fixed frames, or both fixed and moveable frames, may obviously be used for other operations besides rivetting; for example, for boring, countersinking, finishing, and similar operations, boring or other machines with one or more drills or other tools being substituted for the rivetting apparatus. The apparatus for boring or the like comprises a frame fitted with one or more drills or revolving spindles, and arranged to slide or be otherwise adjustable upon the frame bars or tubes, so as to admit of holes being bored in any required position or direction. The rotation of the spindles may be obtained by an engine worked by steam or compressed air, or by power transmitted by a belt from a portable or other convenient engine. When two or more drills are arranged upon the apparatus to operate simultaneously they are made adjustable to suit different distances between the holes to be bored. Tools are provided for adaptation to the spindles for countersinking the holes, and for finishing or dressing the rivets to make them flush with the plates, this last operation being effected in a better manner by the rotatory action of the spindles and suitable cutters than by the ordinary process of chipping.

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1866, July 24.—N° 1925.

PALMER, FITZMAURICE.—(*Provisional protection only.*)—"Im-"provements in ships or vessels of war, part of which improve-"ments are applicable to other ships or vessels." The invention consists of the mode of constructing ships and vessels of war with sides at such angles that when hit above water-line by shot or shell, or other hard projectile, the course of such projectile will be diverted. Also in constructing a keel to enable the vessel to carry a heavy pressure of sail or canvass, to steady her in a heavy

sea, and to prevent her from reeling to and fro when a broadside has been fired from her batteries. The ship having a keel of this peculiar construction has the properties of a vessel provided with great depth of keel, and yet will ride or sail in moderately shallow water. It is also adapted to vessels in the merchant service or yachts where a heavy pressure of sail or canvass is required. The shape of the keel shewn is that of an inverted T, thus ⊥, the lower part of the keel being flanged out, and also hollowed on the under side.

Vessels, according to this invention, may be provided with powerful ploughs or rams of steel, iron, or other suitable material upon either or both ends of the ship, under which, or rather as a part of which, is placed the rudder thoroughly submerged and protected from damage.

The invention consists further in the arrangements for working the guns or battery. The broadside guns are worked upon a turntable, by which they can be used for firing through the side of the ship, or turned upon the turntable and run through an uncovered tunnel to the bow or fore end of the ship, or to the stern or after end of the ship to the port holes.

[Printed, 8*d*. Drawings.]

A.D. 1866, July 25.—N° 1934.

BROOMAN, Clinton Edgcumbe.—(*A communication from Mayeul Bernabé.*)—(*Provisional protection only.*)—" A new or " improved process or method of treating armour plates to render " them inoxidizable." This process or method is based upon the employment of electro-metallurgy applied to cover the plates with an insulating and protective coating of copper, the effect of which when so produced is, by a peculiar action of neutralization of the electric currents, to render the plates quite inoxidizable. It is the application of this process to armour plates, with the view of protecting them, which forms the subject of this invention.

" I proceed as follows :—The plates are shaped, perforated, and " prepared for putting together before being submitted to the " three following operations :—

" The 1st operation is the cleaning. The plates are immersed " in a vessel containing a suitable acid liquid.

" The 2nd operation is the coating with copper by the galvanic " process. The cleaned plates are placed in a bath made alkaline

" by cyanide of potassium; the vessel containing the bath is by " preference stoneware; in the interior is a plate of copper facing, " and of the same dimension as the armour plate; the two con- " ducting wires of a galvanic pile are placed one in connection with " the copper and the other with the armour plate and an electric " current is thereby established, which causes a deposit of copper " upon the armour plate; in a few hours the layer deposited is " sufficiently thick to insulate or separate the iron.

" The 3rd operation consists in strengthening or increasing the " first layer of copper which covers the armour plate by sub- " mitting the plate to a second galvanic coppering. For this " purpose the plate already coated with copper is immersed in an " acid bath of sulphate of copper, a plate of copper of the same " dimensions being placed opposite the armour plate. The bath " is contained in a wooden vessel and is also traversed by an " electric current from a pile. The plates should be left in this " bath for from one to two days, when the coating of copper will " be sufficiently thick."

[Printed, 4*d*. No Drawings.]

A.D. 1866, August 8.—N° 2038.

BENSON, Sir John.—(*Provisional protection only.*—" Improve- " ments in the processes of jointing and connecting together " armour plates used for covering and defending ships, ships' " turrets, or batteries on land, against the effect of shot." The invention consists in dovetailing together the adjoining edges of armour plates by continuous dovetails between them, interlocking them in such mode as to form a continuous plate of equal or unequal thickness, as needed, without the use of the bolts, and nuts, or rivets commonly used, or in combination with such bolts, and nuts, or rivets. And the same plan is applicable to the coverings or decks of vessels, or turrets, or batteries on land or sea.

[Printed, 4*d*. No Drawings.]

A.D. 1866, August 15.—N° 2093.

WHITE, Henry Burt.—(*Provisional protection only.*)—" Im- " provements in apparatus for detaching ships' boats." The apparatus consists of a rod of metal, by preference galvanized iron, passing from end to end of the bottom of the boat into which it may be sunk. This rod turns freely on its own axis, whilst

it is kept in its place either by means of metal eyes placed at suitable intervals, or by bearings bolted to the bottom of the boat. At or near the middle of the rod, a lever arm is secured thereto, at the outer end of which arm is formed a slot; this slot passes over a catch, which is fitted to the bottom of the boat at one side, and by this arm and catch the bar is securely held in a given position. The lever arm can at any moment be released from the catch simply by turning the same. At each end of the rod is formed a projection, having a slot or recess formed therein, which slot or recess receives or fits upon a staple or strong metal pin, furnished with an eye, and carried by a separate eye secured to the bottom of the boat. This slot or recess is so placed that when the lever arm is secured by the catch, the staple or pin is held down and then forms a continuous line with the rod, but when the lever arm is raised and turned over, the staple is free to rise from the recess. Round the staples or metal pins, when held down by the recesses at the ends of the rod, are passed hooks or rings attached to the ends of the chains by which the boat is suspended. It is evident that as long as the staples are held down by the apparatus before described, the boat will hang by its chains from the davits or other points of suspension, but when the rod is turned round so as to allow the staples to be raised out of the recesses the weight of the boat will compel the staples to rise, and as they are thereby forced from the hooks or rings, the boat is instantaneously lowered, each end being set free at the same moment.

[Printed, 4*d*. No Drawings.]

A.D. 1866, August 16.—N° 2104.

CLARK, William.—(*A communication from William Lyman Wetmore, and Nicholas David Le Pelley.*)—"Improvements in "rudders for ships and other water craft." This invention consists in constructing a rudder with two or more blades, arranged in such a manner that a plurality of surfaces will be presented to the water when the rudder is turned for steering the vessel, and the rudder thereby rendered far more efficient than those ordinarily constructed.

To the rudder post or spindle two rudder blades are attached parallel or about parallel with each other, with a space between them; these blades, which form the rudder, may be stayed and

braced by a horizontal partition plate, and the inner part of each blade is hollowed out to form openings adjoining the rudder post. Valves are connected by joints or hinges to the rudder post, one valve being above and the other below the stay or partition plate. These valves are allowed to swing or work freely on their hinges, and close under certain circumstances the openings above referred to. The rear or after part of the space between the blades, *i.e.* the back of the rudder, is open, and when the rudder is turned for the purpose of steering the vessel, the valves, owing to the resistance or action of the water, will close the openings of the blade which is at the rear of the one against which the water first acts, the openings of the latter blade being open, and the water consequently will rush through such openings and through the spaces between the two blades, and the exterior of one blade and the interior of the other will form two steering surfaces, while the water which passes through will, as it leaves the passage, react upon the water at the rear of the rudder in such a manner as to have a tendency to force the stern of the vessel in the direction given it by the rudder.

The openings at the inner parts of the blades may be covered with wires to form a screen, and prevent drift wood from passing through to clog the valves.

[Printed, 8*d*. Drawing.]

A.D. 1866, August 18.—N° 2123.

NEWTON, William Edward.—(*A communication from François Frédéric de Clossmann.*)—"Improved apparatus for saving "life and property in cases of shipwreck." The object of this invention is to save, by means of caissons or buoys hermetically sealed, objects of value, such as gold or silver, precious stones, commercial papers, titles, documents, &c. The buoys are constructed of materials upon which it is known that dependance can be placed, and which are arranged together in such a manner as to form a structure uniting the greatest possible floating power with the greatest resistance to the action of the sea and the force of the waves. In the interior of the buoy is a metallic chamber, which is hermetically shut, and in which are placed the valuables which are to be saved. A circular disc attached to the extremity of a screw prevents these articles from coming violently into contact with each other, by maintaining them in their proper posi-

tions. This mechanism is extremely simple, and, as it limits the space that is to be filled, it gives the buoy such great floating power that it is capable of supporting one or more persons at the surface of the water.

On board steam ships the buoys should be placed in such a manner that in case of the vessel foundering from any cause, the influx of the water into the chambers or wells in which they are enclosed will raise them up, on account of their specific gravity being less than that of the water. The column of compressed air contained in the well will raise up the outer covering, and thus render the buoys free to float about in the vicinity of the wreck. The covering of the chamber containing the buoys may be constructed in such a manner that it may be made to open itself by means of hinges, and to constitute when these two parts are reunited a sort of unsinkable lifeboat, thus affording the shipwrecked mariners a valuable means of safety. The weight of the caissons, food cans, water tanks, &c. that are shut up in the chamber should be so distributed as to effect the opening of the chamber at the moment that the wreck takes place.

The buoy is composed of a metal receiver surmounted by an arched covering which enters into a groove, at the bottom of which is tow and fat, in order to be able to shut it hermetically, so that the water shall not enter; this covering is retained in its place and pressed down by means of six thumbscrews. The metallic receiver is surrounded with hoops of cork, strongly united by long wooden screws. The top of this outer covering is detachable at the same level as the covering of the inner chamber, to allow of the entrance or exit of the objects contained in the buoy. The entire outer covering of cork is surrounded with very tightly pressed network of cord. The network that surrounds the cork lid laps over the network of the other part some little distance. The union of these two parts is made by means of strong ligatures of cord. Attached to the top of the buoy are five loose cords which serve as a means of catching hold of the buoy at sea.

The storeroom referred to is composed of a large iron cylinder the base of which is rivetted to the keel at about twenty inches from the bottom; it is pierced with holes for the admission of the water. The top of this cylinder should reach above the deck, and if possible quite clear of the forecastle and poop. This cylinder, which may be named the safety store for valuable articles, is made

to contain the buoys the number of which would vary according to their sizes. This cylinder can have either one or two doors at will, or can receive its cargo from the opening at the top. The top of this safety store is closed by the lifeboat, which is made entirely of iron; it is divided into two equal parts, which are united at the bottom by three strong hinges. The top part is attached by holding cords to some rings.

Should a wreck take place, and the ship sink suddenly, the water will quickly enter the hold and ascend into the safety store by means of the holes pierced in the bottom; directly the water effects an entrance the buoys will begin to float and push up the life boat that is on the top, the groove of which plays freely. This boat, on account of the immersion, would find itself entirely free, and would fall directly into the water, which at this moment would cover the vessel, at the same time, as no obstacle would retain the buoys, they would also float freely. The buoys should be stowed in the safety store by means of woollen cushions, which would be sufficient to avoid shaking, but would form no obstacle to the rising of the buoys. In case of fire, the buoys being separated from the ship by means of the safety store could not easily be injured even if the iron cylinder became red hot, as the buoys are separated from the cylinder by the woollen cushions, and by rendering these cushions incombustible, either by a solution of alum or other means, they would thus be easily preserved.

Instead of the three strong hinges for the lifeboat one would be sufficient, and should extend the whole width of the boat. In case of fire, the safety store might be surrounded with a second cylinder of thin wrought iron, and the space between the two cylinders might be filled with some substance that is a bad conductor of heat.

[Printed, 8*d*. Drawing.]

A.D. 1866, August 22.—N° 2151.

HYDE, JOHN MOORE.—"A new or improved method of con- "structing armour-plated ships and vessels." The inventor constructs the sides and ends of war ships with two deflecting surfaces or sides continued all round the ship, and so arranged that a projectile striking the vessel will be deflected either over or under the said vessel, the apex of this angular or deflecting side being by preference about 4 to 6 feet out of the water, and the

deflecting angles being about 20 or 30 degrees from the horizontal, thus causing projectiles to glance off either over or under the ship, and admitting of a less thickness of armour plating, and giving greater buoyancy and crew accommodation to such vessel than is usual.

The two ends of the vessels are made available by means of this angular system for fixed turrets. The top angular surface at the ends is carried more inboard than in the central part of the ship and also athwart or across the said ship. At a suitable distance from the extreme ends is a semi-partition, armour-plated and inclined in the opposite direction, so as to admit of forming loop holes for musketry to protect the deck from boarders. The inventor also fixes upon the outside of the angular surfaces vertical or up-and-down pieces of timber; they are secured by screw bolts, the upper ends on the top sides butting against an angle or other bar of iron placed to receive them, and the lower ends on the under sides butting against a similar bar of angle or other bar iron; this external system of timber being intended to act as a cushion, or fender, or buffer, to influence the line of flight and receive the first impact of a projectile, and thus protect the armour-plate beneath the said system of timber.

[Printed, 1s. 6d. Drawings.]

A.D. 1866, August 23.—N° 2168.

WELCH, WILLIAM,—"Improvements in the manufacture of "cement compositions, and in the method of applying and "securing plastic cements to iron and other surfaces." This invention consists in the manufacture of cements, and methods of applying and securing plastic compositions to metallic and other surfaces.

The cements are composed from siliceous, calcareous, basaltic, argillaceous, asphaltic, mineral, metallic, and sandy strata, granulated or pulverized by calcination, chemical, or mechanical means.

The metallic and other substances thus produced, either pure or apportioned to suit the varied practical uses, are then by the aid of vegetable or mineral liquids, acids, salts, and gaseous compounds, mixed and agglutinated into a plastic or fluid consistency, and used as ordinary cement compositions, and for imitation of stones, metals, earths, and ornamental purposes, also for electric magnetic compositions for coating and preservation of iron, wood,

and other substances exposed to marine uses, whereby an insulatory waterproof protection is secured, and a system of galvanism obtained for anti-fouling purposes.

The compositions are manufactured as follows :—The varied geological strata (simple or compound), as earths, minerals, rocks, metals, ores, sands, oxides, bitumens, salts, acids, oils, liquids, or gases, are selected and classified into electric and non-electric, or conducting and non-conducting grades. The following substances are classified for example as electric, and non-electric :—

Negatives.	Positives.
Oxygen.	Potassium.
Sulphur.	Sodium.
Nitrogen.	Magnesium.
Chlorine.	Aluminium.
Iodine.	Manganese.
Fluorine.	Zinc.
Arsenic.	Iron.
Chromium.	Lead.
Boron.	Tin.
Carbon.	Copper.
Antimony.	Silver.
Silicon.	Mercury.
	Gold.

The solid substances are then ground or pulverized or crushed into such granulated sizes as are desirable for the varied purposes of the compositions. When the bodies thus prepared are required to form the liquid or plastic mixtures they are calcined by any ordinary method, and in some cases placed in air-tight or exhausted vessels of cylindrical or other form, around the exterior of which a jacket, shell, or space is provided for admitting heat by steam or other means, for raising the temperature of the compounds to any required degree during the preparation; the vessel is also provided with axes of revolution, through which the necessary heat, gaseous or liquid substances (simple or compound), are injected during its rotary action. The substances thus treated are then classified for mixing in order to produce the different substances needed. The prepared articles are kept free from all atmospheric influence until required for use.

The method of application of the compositions is as follows, namely, the surface or substance to be coated is to be duly ex-

amined as to its simple or component properties; this being ascertained, one or more of the mixtures are selected as an attracting, neutralizing, insulatory, waterproof, or other medium either in liquid or plastic form. The surface of any substance is coated therewith from $\frac{1}{32}$ of an inch (by ordinary brush or plastering methods), or by means of rolling or transferring machines furnished with mechanical arrangements, as also equally distributing and consolidating the same during their rotatory or compressive action. The surfaces produced by either of the above methods are granulated with any metallic or other substances for either galvanism, antifouling, ornamental, or other uses, and a perfectly smooth or roughly finished surface obtained in imitation of stones, metals, or earths, as also supplying a means of attaching any ordinary hydraulic or other plastic composition to metallic and non-absorbent and waterproof surfaces. The compositions are varied in colors for ornamentation and other purposes by the introduction of metallic and mineral oxides, alkaline and earthy salts, or carbonates.

[Printed, 6*d*. No Drawings.]

A.D. 1866, August 25.—N° 2191.

YORK, JOHN OLIVER.—" Improvements in ships or vessels." " In constructing ships or vessels I build two similar floats, " each of great length in relation to the breadth and depth, and " of such a form as to offer as little resistance as possible to pro- " pulsion through the water; these floats have no openings in " them through which water can enter, or any openings which it " may be convenient to make are securely closed; the floats are " placed parallel the one to the other, and are firmly braced " together, and on the floats a framing is erected which carries a " platform. The floats rise only a short distance above the sur- " face of the water, but the platform is carried at a height well " above the waves, so that the sea is able to break unimpeded " over the floats without interfering with the platform which they " carry. The platform for greater security and convenience I " form like a boat; it contains the passenger cabins and the " quarters for the crew, and it may be also the cargo space, but " in vessels of large size some or all of the cargo may be stowed " within the floats. The vessel may be propelled by a large " paddle wheel working between the two floats, or each float may

" have a screw driven by an engine contained within it or " hydraulic propulsion may be used."

[Printed, 10*d.* Drawing.]

A.D. 1866, August 27.—N° 2206.

DAVIS, THOMAS.—" An improved method of or apparatus for " ventilating dwelling-houses or other buildings." The object of this invention is to ensure a perfect ventilation or change of air in the rooms of dwelling houses or other buildings, railway carriages, ships, and navigating vessels, and in all other structures in which it is needed, without allowing a downward draught, or causing any inconvenient current.

In some cases an aperture is made which is called a " per- " haustor," near the ceiling of the room or place to be ventilated (or if desirable lower down) into the chimney, or into a ventilating shaft suited to the purpose. A tube called a " perflator " has one end entering and passing the ceiling, and to this, when necessary, is attached a tube communicating with the open air. The other end of this tube faces or enters the aperture above named, care being taken to leave sufficient space around such aperture for the foul air of the room to enter and be carried forward along the tube or pipe into the chimney or ventilating shaft. If preferred the perflator may be made to act around the perhaustor, and the perhaustor be placed in the centre. In order to quicken the current when a peculiarly powerful draught is required, a jet or jets of gas or other rarefying agent may be placed within a tube in the chimney breast, or in a contrivance in the chimney or ventilating shaft, or simply within the shaft itself. In some cases an aperture is made in the ceiling, and this aperture is connected by means of a tube with another aperture leading into the chimney or ventilating shaft between the ceiling and floor above, or the ceiling and roof above. Into such tube another tube runs (communicating or not as may be requisite with the open air) and proceeds more or less towards the aperture in the chimney or ventilating shaft, and if desired it may enter it. Or the open air tube need not be employed; in which case an aperture is made in the ceiling to introduce one end of the tube, and thus connect the aperture in the ceiling with the air aperture made in the chimney front over the fire-place. The open end of

the tube is brought opposite to the opening into the chimney, care being taken to leave space enough between the two tubes or pipes for the passage of the foul air from the room.

In another class of cases, where there is neither flue nor shaft, or neither is required, "I simply make an aperture in the ceiling " or upper part of a room or building and point towards it, or " make to enter it a tube from the open air, leaving adequate " space around, as above, and I use in addition (where requisite) " gas or other rarefying agent within a tube ascending from the " aperture. In all cases I make ample inlets for air just where " and as they are least inconvenient."

[Printed, 10*d*. Drawing.]

A.D. 1866, August 29.—N° 2223.

WHITBY, TIMOTHY.—" Improvements in constructing vessels " of war and other structures required to be rendered shot- " proof." * In constructing vessels of war according to this invention, the inventor attaches armour plates to the exterior of those parts of the outer skin of the vessel that are required to be rendered shot-proof, and outside the armour plating he fixes metal plates formed into loops or otherwise, so as to present inclined or curved surfaces to projectiles, in order that the projectiles may be deflected by these surfaces, and so turned out of their course before striking against the armour plating; the projectiles will thus be prevented from striking fairly against the armour plating, and therefore the armour plating will be better able to offer resistance. The curved plates are by preference of steel, in order that when struck by a projectile they may act as springs, and take away from the velocity of the projectile; a thin skin or plating is placed outside the curved or angular plates to enclose them water-tight, and form the exterior of the vessel. If desired, armour plating may be dispensed with, and the curved or other plates be alone employed to protect the outer skin of the vessel. The curved or angular plates are by preference secured in such a manner that they can readily be removed and replaced. If desired two sets of curved plates may be employed, one exterior of the other.

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* See also No. 3352 of 1866.

Batteries, forts, and other structures desired to be rendered shot-proof, may be protected in a similar manner to that above described.

[Printed, 10*d*. Drawing.]

A.D. 1866, September 3.—N° 2261.

BONNEVILLE, HENRI ADRIEN.—(*A communication from Thomas Huntington.*—"A new and useful improvement for "detaching boats from their davits." The invention has for its object the simultaneous detachment of the hooks of both the front and rear tackle blocks from the boat.

The apparatus is attached to the front and rear thwarts of the boat, and is constructed of a metal plate let into each of the thwarts, and firmly bolted in position, and having two upright lugs or ears, between which a bar or hook is secured by a pin, the former being allowed to work or turn freely on the latter. Each hook consists of two arms at right angles to each other. The short arm, which is horizontal when in use, lies above the thwart. The long arms extend down through holes or openings in the thwart plates, and have shoulders upon the upper edges of their lower ends, for the arms on a shaft to abut against and keep the upper ends of the hooks in about a horizontal position, and near the upper ends of projections on the thwart plates. There are two of these shoulders on each plate, one on each side of the hole or opening in the plate. When the hooks are thus secured in position, the davit tackle hooks may be fitted under them, and without the possibility of becoming detached, unless the arms above referred to are moved down by turning the shaft on which they are fixed. This shaft is suspended under the thwart, and is turned by pulling up a ring sunk in the upper side of the thwart, which is connected with a lever on the shaft. The shaft extends from the front to the rear thwart, and both arms are attached to the same shaft, so that both arms will be moved at the same time, or by the same movement of the shaft, and the hooks of both tackle blocks will be liberated at the same time. When the boat is lowered, so that it touches or nearly touches the water, the shaft is turned by the coxswain, or other proper person in the boat, and both hooks are instantly liberated from the davit tackle hooks, and the boat is set free.

[Printed, 1*s*. Drawings.]

A.D. 1866, September 5.—Nº 2283.

ROBINS, Henry.—" Improvements in sheathing iron ship " and other floating bodies, and other iron structures subject to " the action of sea and other waters." For these purposes, the iron surface to be sheathed has formed in it at suitable intervals apart dovetail grooves or recesses, each groove being divided longitudinally by a wedge-formed projection, which stands up from the bottom of the groove; the sheathing plates, which may be of zinc or other suitable metal, are rolled or formed with projecting ribs or flanges to enter and be firmly wedged into the undercut dovetail grooves in the iron surface. The ribs are held firmly in the grooves by wedge-formed projections from the bottom of the grooves, bending out the ribs of the sheathing plates, and pressing them against the undercut sides of the grooves, so holding them securely. The depth and width of the grooves in the iron surface may be varied, but it has been found that a depth of one-eighth of an inch is in most cases sufficient to hold the plate securely. In order to connect together the adjoining ends of two plates of sheathing metal, the inventor sometimes bends over the ends of both plates, and hooks them one over the other, a solution of india-rubber, or other suitable cement or paint, being placed between the lapped ends of the plates to make a water-tight joint.

[Printed, 8*d*. Drawing.]

A.D. 1866, September 6.—Nº 2294.

BERNEY, Thomas.—" Improvements in the construction of " ships and other vessels." The invention consists of forming longitudinal stringers, and also ribs and keels, and stems of vessels of lattice beams and girders, also in similarly forming the longitudinal deck girders, and also in constructing the minor deck girders of which these are formed; but the minor girders are differently braced; also in similarly forming the main longitudinal girders and transverse girders for supporting cupolas on decks, and for supporting deck girders or deck beams; also in forming lattice girders by connecting together the lower members of the rib girders by incline bars running from one to the other, and forming as it were a herring-boning between them; also in forming lattice or other braced girders of the pairs of strut bars of the main central keel girder, and in forming them, or

some of them, as main central ladders; also in the employment of a lattice girder to give lateral support to a ram head or stem frame; also in forming a ram head by the combination of several longitudinal lattice braced stringers with the stem post, &c. The inventor claims protection for these the said lattice braced girders, keels, ribs, stringers, stems, or otherwise, in the positions above specified and elsewhere in ships and other vessels, and for other machinery described, and for any modification of the same. Each beam is composed of two or more members formed of metal bars or plates, or sets of metal bars or plates, of suitable form and construction, the said members being connected the one to the other by a latticework of metal bars. When using longitudinal stringers of lattice beams they are applied to each side of the vessel by preference on the inside of the ribs (if ribs be used) or other frame or framing of the ship or vessel, or along the bottom where required, and attached to these ribs or other frame or framing, or they may be used as the framing itself of any ship or vessel. The members of the beam which are connected by the latticework of bars are curved more or less to the form of the side, or of the bottom, or of the deck, or of any of them, of the vessel, and they are connected together at intervals by bars, by preference at right angles to any horizontal line lying in the central longitudinal plane of the vessel. Between these bars are diagonal trusses composed of metal bars, and towards their ends at the point of their intersection with the before-said bars they are connected to the longitudinal members of the beam by screw bolts, rivets, or otherwise. These diagonal tie bars or trusses may all either run diagonally from the end of one bar to the opposite end of the next bar, or the truss bar starting from one end of a bar may pass to the opposite end of the next bar, and the truss bar from the opposite end of the bar in place of passing to the end of the next bar may pass to the end of the bar beyond it, according to the angle at which they may require to be set; or in place of the above construction of lattice girders other forms of lattice or other braced girders may be used. Any number of longitudinal lattice-braced stringers, as above described, may be applied to the sides of a vessel at distances apart from each other according to the amount of strength required to be obtained. When making ribs of a vessel of lattice girders the members which are to be connected by the lattice work are curved more or less to the form of the transverse sections of the vessel, and they are

connected together by strain or suspension rods or bars, between which are lattice bars consisting of struts and ties arranged in a similar manner by preference to that first described with regard to the longitudinal stringers. In some cases the outer members of the two series of girders thus crossing each other may be combined together wholly or in part in the same course. It is preferred in other cases to apply the outer member of the longitudinal girder to the inside of the outer members of the rib girders, so as to admit of a course of bars being placed edgewise in an oblique direction between the latter, and in some cases of a second course of bars being arranged across the first course and in such manner that the two together form one course with the said outer members of the said rib girders, and with which they are to be combined, and in conjunction with them to form lattice braced girders, and of the whole being supported by the said longitudinal stringer girders. The inner members may receive support from the inner skin of the ship; also the lattice girder ribs may be used without using the lattice girder stringers, and the said lattice girder stringers may be used without using the said lattice girder ribs. If desired, distance columns and tie rods may be used to connect the several lattice braced ribs the one to the other, and the longitudinal lattice braced stringers, if more than one be used, may in a similar manner be connected the one to the other. It is preferred to form each distance column with a male screw at one end; the male screw is to be passed through holes formed through the truss bars of the lattice bracing, and then to be screwed into a female screw in the end of another column on the opposite side. When using longitudinal braced stringers as main central keel girders to a ship, a single girder of any one of the above described or of other forms may be used, its lower member being formed with the keel or kelson of the ship; the common form first described, consisting of the usual series of suspension bars connected by struts and ties, is preferred to be used for this purpose, its upper member is placed in or about the plane of one of the decks, or the deck is made to harmonize with it, and by preference in or about the plane of the upper deck. The struts in this central girder spring from the keel; they commence at or about the centre of the ship, and lean towards the stem and stern posts respectively, and are inclined by preference t an angle of 45 degrees with any horizontal line lying in the central plane of the ship. The level of the intersection of the

struts and ties is preferred as the height for one of the other decks; but in some cases it is intended by this invention, to form the main keel girder of two girders side by side, and farther as a modification to have them so combined in one that though meeting together along the kelson their respective pairs of strut, tie, and suspension bars, except where meeting together or otherwise combined towards the stem and stern, shall lean away from each other from the kelson upwards, and in such manner that the line of their respective members at the level of any deck shall be widest apart at or about the midship section, and shall thence approach each other by curves similar or nearly so to the respective deck lines of the ship. To keep the horizontal pairs of members which at the level of each deck may be combined with this duplex and cradle girder frame in their relative positions, they have at intervals suitable supports from one to the other, and some of these by preference may be placed at the points of intersection of their respectivs struts and ties, and at the head and in the plane of the suspension bars. Similarly the pairs of strut bars stand in juxtaposition to each other in such manner as to combine each pair of strut bars together into one main compound strut girder, and this series of strut girders thus constructed it is proposed as a part of this invention to form, where conveniently situated, into ladders, and thus to afford means for an uniform system of main central ladders throughout the ship, increasing in width in some cases at each deck, and reaching where desirable from the floor of the ship to the upper deck.

This invention has further for its object to strengthen the stem of vessels intended to incur violent shocks by converting the arch of the stem post into a powerful girder, by introducing into the said arch a chord from the keel to the upper part of the stem post, and by fastening it securely by another iron bar which must be secured behind the projecting point of the arch, and be combined also by preference with the fore suspension bars of the main longitudinal central keel girder of the ship and be placed in the line of force to be exerted, and the whole also to be braced together by pairs of struts and tie bars.

The inventor also proposes to support the same laterally by uniting with it a pair or more of the aforesaid longitudinal lattice braced stringer girders, the same to be placed and fixed along the inner curve of the ship's side and in the plane of the force to be

exerted, but others rising from a lower level may be united with it, and so in some cases form by themselves a ram head.

When a ram head is constructed upon the plan of this invention, in conjunction with the main central keel girder of the ship, the fore pair of the suspension bars of the said girder are united together at the kelson and also at any point above the ram head framing, and, by preference at the level of one of the decks, but are kept apart from each other in. suitable curves by proper distance pieces, in such manner, and as a part of this invention, that the whole shall form and act as a girder and fulcrum to the central lever bar of the ram head, the after end of which is secured in its place by a bulkhead or otherwise; so also will the pair or more of longitudinal lattice braced stringers lying at and about the level of the ram head, act as a fulcrum to give to it lateral support. The upper member of any transverse girder may be of any required height, but will, by preference, follow the under side of one of the decks. These girders may be placed across the ship at intervals, but, by preference, in the planes of the respective suspension bars of the main central keel framing. If carried to the height of the main deck or to any height to which it may be desirable to make the usual water-tight and fire-proof divisions, a compound lattice braced girder, composed of two or more of such girders as are above described is preferred in some cases to be used, and as the usual divisions are supposed to be inefficient for the latter purpose it is proposed as a part of this invention to make improvements in the fireproof divisions by making parts of the girder in duplicate, and to arrange them in such manner as to form frames or cradles somewhat similar in form to that described of the main central keel girder, or otherwise. The cradle girders thus constructed can be lined with plates, and used as water tanks, thus rendering them, it is contended, efficient fireproof divisions.

When using longitudinal lattice braced stringers at the level of any deck they are placed as nearly as they conveniently can be in the plane of the said deck, and in some cases it is preferred to use any one of them or of triangular girders in such a modified form as to act as a substitute throughout their extent for the usual deck beams.

The modification and improvement in any girder as a part of this invention for the support of decks in lieu of deck beams

consists, first, in making the two members of which each strut is composed to act together as a girder under the deck, the upper member follows, by preference, the curve of the deck; the lower member hangs in a curve beneath it; secondly, the ties are also preferred to be made of two members, and to be similarly arranged as girders, and being shorter are placed between those of the struts; thirdly, where the deck is lined with iron plates, use is made of them by placing the suspension, or in this position more properly called, strain bars, in a curve beneath, so as to act as girders in tension in opposition to the said deck plates in compression. Where no deck plates are used the said strain bars are also preferred to consist of two members, and to act as girders similarly to the struts and ties. In some cases two, and in most cases more than two, of these complex girders so composed are compounded together to give a sufficient and uniform support; each of these under girders is suitably braced, their respective members are kept in their places by suitable distance pieces inserted at the various points at which these under girders intersect one another, and which, by preference, may be hollow columns and tie rods, and in some cases where requisite one or more girder bars or beams of this form I, called H-iron, may be placed longitudinally through the line of under girders in such manner as to act as continuous distance pieces to them, and distribute any stress upon them more evenly.

The inventor further claims the invention of a new plan of naval architecture for rams, and for other ships and vessels, by the combination of lattice braced girders, one or more for the keel, and forming the central framing of the ship, and at the level of the ram head, and throughout the whole form of the vessel in combination with transverse sectional girders and ribs, formed also of lattice braced girders, and connected together by a latticework of bars so as to form other intermediate girders, part of this invention, and forming the frame of the ship; these bottom girders are constructed by connecting together the outer members of the rib girders respectively by two courses of bars crossing each other in an inclined direction from rib to rib, the depth of the two courses being, by preference, equal to that of the said outer members, and the girder ribs are so, as it were, herring-boned together. The main weight of the framing is thus brought gradually towards the centre of the ship.

This invention has also for its object improvements in the construction of ships of war by the introduction of a new system of bullet-proof shield and scale armour as curtains to the port holes for the purpose of affording protection against bullets of small arms. The improvement consists in linking rings of suitable size, substance, and form together, so as to form a fabric or chainwork (the principle of which is used by application) capable of extension and contraction, and then in fastening to the rings, some on one side and some on the other, suitable iron plates, so as to form a system of armour which even when extended shall be impenetrable to bullets of small arms. By this means a system of shield and scale armour capable of extension and contraction is formed, so that if hung before a port hole and the muzzle of a gun be run out, it will extend and hang about it, and will again resume its contracted form on the gun being withdrawn; it affords also the means of giving ventilation.

Also a more secure method of fastening heavy armour on to the side of a ship by the use of bolts, which have the screw end much larger than the stalk of the bolt, and taper conically down to its size without any square shoulder. The hexagonal or other flat-sided head is larger than the usual regular size, and also tapers conically down to the size of the stalk, so as to fit a hollow in the backing plate; the bolts also it is preferred to insert into the back only of the armour plates from the inside of the vessel, instead of from the outside, and the holes for the screws to be sunk and tapped no farther than is necessary, a piece of sheet lead being placed at the bottom as a cushion.

And, lastly, for providing facilities for inspecting the state of the space between the inner skin of a vessel and the ship's bottom by inserting at various places in the false bottom screwed double plugs, the larger one to be screwed into the false bottom and to have set in it concave and convex glass (of good clear stout glass) semi-circular by preference, and of such size that the bull's-eye of the hand lanthorn could be held into it, and the smaller plug to be screwed into it easily to protect the glass.

[Printed, 2*s*. 6*d*. Drawings.]

A.D. 1866, September 10.—N° 2327.

CURTIS, WILLIAM JOSEPH.—" Improved apparatus for steering " steam vessels." The first part of this invention consists of

improvements "upon the invention for steering ships described in "the Specification of my Patent, dated Sixteenth June One "thousand eight hundred and sixty-two, No. 1782."

The propelling engine shaft terminates in a ball or boss. The blades of the screw are cast on or attached to a hollow spherical socket in which this ball or boss is inserted, the two together forming, as in the Patent above referred to, a universal or ball-and-socket joint, and thus leaving the screw, while rotating, free to swing across the line of the vessel's keel. The ball or boss is slotted to receive a coupling pin, the rounded ends of which enter bearings made to receive them in the spherical socket. This slot in the boss is so formed as to allow for the vibration of the coupling pin which transmits the driving motion to the screw, and which whenever the screw is used for steering or is working out of the line of the driving shaft must, as a consequence, rock in the slot. An eye is made in the middle of the coupling pin to receive a cross pin which connects it with the boss. When the screw is at its extreme angle of forty-five degrees with the propelling shaft the coupling or driving pin oscillates forty-five degrees. The interior of the socket is formed with recesses to receive blocks of hard wood which, if thought desirable, may slightly protrude beyond the surface of the metal. By this arrangement the friction of the ball-and-socket joint will be greatly reduced, the water having at the same time free access within the joint, and if necessary, holes may be provided so that a circulation or free passage of water may be ensured through the joint. Forming part of the hollow socket there is a tail or guiding spindle which works in a bearing in the moveable or swinging after stern post. When, therefore, the latter is moved by the helm or tiller, the screw is acted upon in a corresponding manner. The moving stern post does not perform the functions of a rudder, because the current of water created by the action of the moving screw acts always in the same line upon the after stern post, whatever angle the stern post takes with respect to the ship. The rudder is connected with the after stern post in the ordinary way; its shaft or spindle does not reach up so far as the counter of the ship, but is fixed to a crank, the end of which crank is connected with a moveable collar by a link. This collar is carried by a double crank or saddle fixed to the lower end of a shaft, which passes upwards through the hollow shaft at the head of the swinging after stern post, and is continued to the upper deck of the ship, where it is

connected with the helm or tiller, so that when required the rudder may be worked by hand in the ordinary way. The hollow shaft of the swinging stern post referred to passes through the socket of a carriage fixed to the lower deck; a prolongation of this carriage is carried sternwise, and two bosses formed upon it have holes to receive shifting bolts. By means of these bolts the screw and rudder may be made to act in concert, or the screw may be made to act alone in steering the ship, the rudder trailing in the water and producing no effect whatever; or, lastly, the screw and after stern post may be fixed as in ordinary screw steamers, and the steering effected entirely by the rudder.

The second part of the invention relates to a method of steering steam ships by means of gearing connected with the propelling engine, or by a separate engine adapted for the purpose. In this case motion may be taken frcm the driving shaft of the propeller, and communicated by means of bevilled gearing to a worm and worm wheel on the rudder head, the worm wheel being connected with a friction hoop. The operations before described as being performed by a hand tiller would in this case be performed by a lever, which moves a clutch and causes the motion of the shaft to communicate motion to the rudder, either to port or starboard as required. Through this lever, therefore, the engine may be made to actuate the rudder, either independently of or in combination with the propeller. The friction wheel is applied in order to meet the contingency of a heavy sea striking the rudder which might endanger its safety, in which case the rudder would give way, and the helmsman, by merely throwing the lever into gear, would immediately bring the rudder into its proper place again, no readjustment being required. When it is found desirable to use the helm by hand, without the steam power, by drawing the worm out of contact with the wheel on the rudder head, the apparatus will be instantly released. The steering lever may be placed in any convenient position forward, on the bridge, or where the helmsman may keep his own look out. By the main shaft being disconnected from the engine by a clutch or otherwise, when the ship is working under sails alone, the propelling screw and shafts will turn round by the progress of the ship through the water, so that the above described apparatus may be made to govern the rudder and steer the ship, the same as if the shaft were driven by steam as before described.

[Printed, 10*d*. Drawing.]

A.D. 1866, September 25.—N° 2474.

TAYLOR, THOMAS BURTON.—" Improvements in pumps for " ships." The pump barrel is to be furnished with what may be termed a solid plunger in the sense of its occupation of space in the pump barrel; it is, however, hollow and open at the top, permitting the connecting rod from the lever handle or crank to pass to the lower part of such plunger, where it is jointed thereto. The plunger is fitted in a packed gland, or is otherwise sufficiently tight to obtain the necessary vacuum in the barrel, and to guide the plunger in its rectilinear motion. One valve is on the top of the suction pipe, the seat being raised a little above the bottom of the pump chamber; this valve is of the full area and passage of the suction pipe. The valve preferred at this point is a lift valve, with a guiding stem above, which works in a guide in a bridge piece, or it might be a perforated diaphragm separating the valve chamber from the body of the pump barrel. For simplicity and economy a clack valve may be used if desired. The delivery valve is placed on a spout, and a clack valve is used at that point in a somewhat pendant position. Thus pump boxes are dispensed with, and the pump will raise any floating or even denser matters that may come up the pipe without danger of choking, having a free passage throughout equal to the area of the suction pipe; it at the same time works very easily, and does not require the introduction of water at the top to obtain the necessary vacuum in the first instance.

[Printed, 10*d*. Drawing.]

A.D. 1866, September 27.—N° 2495.

BAYLEY, JOHN CLOWES, and CAMPBELL, DANIEL.—(*Provisional protection only.*)—" Improvements in the sheathing of iron " ships." The object of this invention is to overcome the great difficulty which has been experienced in sheathing iron ships with zinc or other metals, and the invention consists in having the sheets of zinc or other metals sufficiently large to admit of being folded over the edges of the iron plates corresponding therewith. In constructing the ship space should be left between the plates at the butt joints (it being understood that all that portion of the hull which requires sheathing is built upon the butt-joint principle) rather more than sufficient to allow of the said turned-over edges of the sheathing being inserted, and when thus placed the space between is filled up with oakum, lead, or other suitable

material which will admit of being caulked hard, and thus not only bind the sheathing to the ship, but in the case of zinc sheathing being used, press it hard to the edges of the plates, thus bringing them into perfect galvanic contact. The surfaces thus brought into contact being sufficient to keep up galvanic action, marine glue or other adhesive substances may be used over the other portions of the zinc plates to bind the same to the iron. If instead of zinc, copper or any other metal negative to iron be used, it is proposed to insert a felt or other non-conducting substance between the edges and surface of the iron plates and the sheathing, thus preventing decomposition of the iron by galvanic action.

[Printed, 4*d*. No Drawings.]

A.D. 1866, September 27.—N° 2498.

THIBAULT, Joseph Eugene.—" Improved means or appliances for preventing ships or vessels from foundering by imparting additional buoyancy thereto." For this purpose each berth or sleeping compartment is so constructed that when closed the whole of them may be readily converted into separate water-tight compartments containing atmospheric air. In the case of passenger vessels, great additional buoyancy may thus be imparted by converting the whole of the berths into air-tight compartments, but for additional security the separate cabins may be so constructed that when the doors are closed they may be converted into water-tight compartments. Water-tight cells or compartments are also formed in combination with the fixtures or fittings of a vessel, in order to impart additional buoyancy in case of danger, such cells or compartments being used as receptacles for provisions, cargo, or other uses until required to be converted into water-tight compartments. For this purpose the tables, couches, lockers, or other fixtures are so constructed as to be readily converted into water-tight compartments when required. For the stuffing of the seats granulated cork may be employed, or they may be made of india-rubber inflated, or capable of being inflated when required. Where considerable additional buoyancy may be required, permanently elastic hollow surfaces may be arranged to lie flat against the roof of the cabin, or be fixed in any other convenient position, so as to take up but little space when out of use, and which may be inflated by means of a pump or otherwise.

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1866, October 1.—N° 2524.

CHALMERS, JAMES.—" Improvements in bolts and washers." This invention has for its object to prevent the breaking of bolts by sudden concussions, such as are caused by the impact of shot on armour plates attached to ships of war or fortifications. As bolts subjected to sudden concussions are liable to break at the thread, where the cross section is reduced, it is proposed to increase the size of the bolt and reduce the section of the shank, so as to be equal to the section at the bottom of the thread, in the following manner:—Taking a bolt, say, 2 feet in length and 2½ inches in diameter, the area of the cross section would be about 5 inches, and allowing for depth of thread one-eighth of an inch, the area of cross section at bottom of thread would be about 4 inches, hence the shank of the bolt would be reduced one inch. This reduction it is proposed to effect by a slot through the centre of the shank, commencing at, say, one inch from the termination of the screw thread, and ending about an equal distance from the inner part of the head of the bolt. This slot, to facilitate making and lessen cost, it is proposed to form as follows:—The iron of which the bolt would be made would be a half round (or nearly half round) bar, two pieces of which, of the length required, would be placed with the flat sides facing each other, with a piece of iron of the same breadth and ½ inch thick or so between them at each end, which when welded would make the solid part of the bolt, leaving the space between to form the slot. This slot when the ironwork was finished would be filled with a slip of wood or iron driven in tight with marine glue or some other adhesive substance to secure it. A bolt thus formed could be of the same diameter throughout its entire length, thus filling the hole and making a good fit. For washers for armour plate bolts, or where sudden concussions are expected, it is proposed to use next the skin of the ship or surface to be acted on a wooden or other cushion washer of tough but not too hard materials of, say, from half inch to one inch in thickness, then an iron washer of, say, a quarter or half inch thick, having its outer edge pressed or turned down, say, a quarter inch, so as to surround and embrace the cushion washer in order to prevent its falling out in case of its being fractured.

[Printed, 8*d*. Drawing.]

A.D. 1866, October 3.—N° 2540.

HOPE, William, and BROWNING, Henry.—"An improved "composition to be substituted for ordinary paints." The invention has for its object an improved composition to be substituted for ordinary paint in all situations which are exposed to atmospheric influences and where light colours are not called for. It not only resists in a remarkable degree the action of the atmosphere and of rain water, but also that of sea water. It is prepared with asphaltum and drying oil. The proportions may conveniently be 90 per cent. of asphaltum and 10 per cent. of the oil. The asphaltum is first melted separately, and when partly cooled the oil is added after being warmed. These two materials are then thoroughly mixed. Before being used the composition is thinned down to any desired consistency with naphtha or spirit of turpentine or other similar solvent.

The following compositions have been found in practice to yield very good results for coating ships and out-door iron and woodwork :—Asphaltum, sixty parts; oil, twenty parts ; spirit, twenty parts.

[Printed, 4d. No Drawings.]

A.D. 1866, October 3.—N° 2547.

SCOTT, William Dundas. — (*Provisional protection only.*) — "Improvements in raising vessels, and in the machinery or apparatus employed therefor." The invention has for its essential object, first, the raising to the original plane of flotation of vessels which have been sunk; secondly, the emersion of such craft as may require repairs or external examination.

In carrying out the first part of the invention a strong iron frame is provided, and this is constructed so as to fit around the vessel's bottom. The frame is provided at one end with a strong hinge, whilst the opposite end is tapered to receive a ring cramp. The sides of the frame are fitted with pontoon attachments, consisting of ring bolts, these pontoons being provided with drop hooks, which being drawn through the rings catch therein, and in this way, as several pontoons or floating chambers are drawn down sufficient force is conserved to raise the sunken vessel, which is brought to the surface resting in the framework. By this means the under girding of sunken vessels is avoided, and the snapping

or breaking of the chains or ropes as they are drawn tight on the edge of the keel is prevented, whilst the vessel itself is also raised in less time than formerly.

The process of lowering the framework is rendered self-acting, on account of the required depth of immersion being previously ascertained, and sufficient length of rope allowed between the frame and floating chambers, so that the frame may be floated out at once to the vessel which has to be raised, and around which it is made secure by a cramp placed over the taper ends.

According to the second part of the invention that which has been described above as a framework with pontoon attachments is made a pontoon proper, and fitted with sluice valves, which being opened water is admitted, and the pontoon sunk to any depth required. The pontoons are brought round the vessel to be raised, and the water pumped out, so that the vessel is speedily lifted out of the water, being held by the pontoons gripping the keel, whilst additional support is given by stays or props resting on the upper part of the pontoon.

[Printed, 4*d*. No Drawings.]

A.D. 1866, October 9.—N° 2608.

DUDGEON, William.—" Improvements in constructing ships " or vessels propelled by twin propellers, and in steam-engines for " giving motion to the same." In constructing the after parts of a ship or vessel propelled by twin propellers, where external stern tubes are used projecting to a distance from the after parts of the body of the ship or vessel, such stern tubes are, according to this invention, connected together horizontally (or as nearly so as may be) from end to end by means of framing and plating, bracing them together to and through the body, or in some cases, in place of two stern tubes being used the screw shafts are enclosed in chambers formed by plating, and projecting horizontally on each side of the stern of the ship or vessel; these chambers serve as the stern tubes for the two propeller shafts, and in the interior of the after parts of the body of the ship or vessel there is a horizontal framing and plating corresponding in position with the outer plating above mentioned, by which conjoined construction great additional strength and stability are obtained.

In constructing steam engines for giving motion to twin propeller shafts, two pairs of steam cylinders are used, one pair to each

of the two cranked shafts; the two pairs of steam cylinders are arranged in inclined positions and end to end. The angular space below the two pairs of steam cylinders, and between them and the floor of the ship or vessel is enclosed and formed into a condenser or condensers, and the air and other pumps, and hot well or wells are also included in the angular space below the steam cylinders. The framing for carrying the two propeller shafts is formed on either side, and combined with the framing and parts which carry the two pairs of steam cylinders, and enclose the angular space below them.

[Printed, 1s. 4d. Drawings.]

A.D. 1866, October 13.—N° 2657.

WREY, WILLIAM LONG.—" Improvements in the construction " of ships and vessels with a view to speed and buoyancy." The object of this invention is to obtain, firstly, a maximum speed in such vessels, and, secondly, to render them unsinkable, they being chiefly intended for the conveyance of passengers and light cargo. It is proposed to construct the ship or vessel of the following midship or widest section :—" As a proportionate scale I form " the extreme width of about one hundred feet." " From the " extreme or widest section " " I propose to form the fore part " with a gradual taper extending from the widest section to about " 500 feet in length, to form a pointed bow or cutwater, the after " part to be in parallel lines, the same width as the widest section, " terminating in a semicircular stern, the length of the after part " being about 250 feet from the commencement of the widest " section, that is to say, the total length of the vessel would be " about 750 feet long; she would thus taper forward to a very " fine point, thus giving her the sharpest possible cutwater, and " enabling her with the aid of the comparatively flattened bottom " to attain a maximum speed, or one higher than has hitherto " been attained by the fastest vessels." It is proposed to apply several engines and boilers, fairly distributed throughout the vessel instead of concentrating an undue weight in an isolated position.

The bottom of the vessel is formed from the water line or extreme width at an incline or angle of about 28 degrees. The vessel is strengthened by a rib or backbone running vertically as far as necessary from end to end through the central longitudinal

section; but this rib is no part of the invention. Three internal decks are formed about 10 feet apart, the two upper internal decks giving a space including the backbone of about 60 feet in width, by nearly 10 feet in height, by means of bulkheads or partitions descending vertically from the angles formed by the sides and top deck of the vessel to the sides of the vessel below the water-line. Within the space thus formed (that is to say, the space between the partitions or walls and side and bottom of the vessel contained by the angle formed by the junction of the sides and bottom) it is proposed to construct a continuous series of air and water tight bulkheads or compartments, forming as it were, a system of cells or honeycombs, so that in case of leakage, collision, or striking on a rock, the vessel would always be sufficiently buoyant to keep above water, and thus the foundering of the vessel would be rendered an impossibility.

[Printed, 8*d*. Drawing.]

A.D. 1866, October 16.—N° 2676.

NAPIER, Robert.—"Improvements in building ships and "vessels of war." "In building a ship or vessel of war where "turrets or cupolas are used such turrets or cupolas are formed, "carried, and worked in the following manner:—Immediately "under each of the turrets or cupolas (which I propose should "work their guns over the upper deck) I place an armour plated "cylinder, rather less in diameter than the turret and of a depth "sufficient to extend from the deck, at the level of which the "outside armour plating of the ship stops to a little above the "level of the lower edge of the wall or sides of the turret; "the lower edge of the walls of the turret thus a little over-"lapping and protecting the upper parts of the armour-plated "cylinder. On and around the upper parts of the cylinders, or "under the floors of the turrets, circular trucks or rails are formed "on which the cupolas or turrets are supported and revolve on "rollers or wheels. The amount of overlap of the walls or sides "of the turrets on the cylinders depends on what is necessary for "the protection of the rollers or circular trucks. The cylinders "are to be securely fastened to the main or other deck on which "they rest, and otherwise to be properly secured and supported "by suitable frames and pillars underneath. For causing the "turrets or cupolas to rotate hydraulic or other power may be

"applied," so as to turn "a strong vertical shaft attached to the "centre of the floor of the turret, and extending down and "stepped on one of the lower decks or keelsons. From the lower "end of this shaft diagonal struts or supports may, if wished, "extend up to the floor of the turret, so that part of the weight "of the turret may be carried through the vertical shaft or pillar "to the step. The cylinders and turrets are to be constructed "and covered with armour plates according to the strongest and "most approved plans for resisting shot."

By these arrangements greater sea worthiness, better ventilation, a safe communication and passage for men and ammunition between the decks and the insides of turrets or cupolas will be obtained.

[Printed, 6*d*. Drawing.]

A.D. 1866, October 18.—N° 2692.

CHAPMAN, Charles.—(*Provisional protection only.*)—"Im- "provements in the construction of ships for war purposes, appli- "cable in part also to the construction of forts." The invention consists in constructing war vessels with a solid mass or masses of metal at each side amidships, at stem or stern or at both, each such mass to be of such a size that it can be made or pierced so as to form therein one or more chambers, each such chamber being capable of being used as a gun or of receiving a gun. Where the chamber itself is used as a gun, it has an arrangement for the purpose of rendering it breech-loading; when the chambers are employed merely as receptacles for guns, either breech-loaders or muzzle-loaders may be used. When these last are employed the trunnions are dispensed with, and they are fitted beneath or at the sides with friction rollers to enable them to be run in and out with facility; or with a rack and pinion, or any similar suitable means. When these solid masses of metal are employed at the sides amidship the motive machinery is to be placed within the space between the two sides, so as to be thereby completely protected from injury by the enemy's shot or shell. It is proposed in some cases to build up dovetailed pieces of metal, keying and bolting them together so as to form solid or nearly solid masses of metal, which will answer the same purpose as the solid mass or masses.

The invention further consists in so constructing the hulls of the vessels as to give the necessary strength and buoyancy to

enable them to carry the large masses of metal. In order to do this the inventor constructs within the hull of the vessel a number of tubes, which tubes may run side by side parallel to each other, and be firmly connected to each other and to the sides and bottom of the hull by angle irons and framing, or may be so built up as to intersect each other. By this framing and angle irons the hull of the vessel is connected with the tubes so as to form altogether a strong beam with hollow cells or buoyant compartments.

[Printed, 4*d*. No Drawings.]

A.D. 1866, October 26.—N° 2776.

SIMPSON, TRISTRAM SHANDY.—(*Provisional protection only.*) —" Improvements in the construction of ships' boats, which im-" provements are chiefly applicable to the construction of life " boats." " The hull or body of the boat is composed of a series " of longitudinal planks or boards stretching from end to end of " the boat, so formed that their sides radiate to a centre within " the boat. The outer faces of these boards are triangular in " section, the apex outwards, and are fastened firmly together " and to the thwarts which form bulkheads, completely isolating " each compartment from the others. By means of this arrange-" ment I can construct a boat without inside ribs, and much " lighter and stronger than by the ordinary way, while the trian-" gular form of the outer edges of the planks gives a much larger " surface and renders it much more difficult to upset the boat. " I add all the usual appliances for obtaining buoyancy."

[Printed, 4*d*. No Drawings.]

A.D. 1866, October 29.—N° 2792.

TWEDDELL, RALPH HART.—(*Provisional protection only.*)— " Improvements in hydraulic presses and apparatus connected " therewith for bending metals, part of which is applicable for " other purposes." This invention has for its object, first, improvements in hydraulic presses and apparatus employed for bending or setting angle irons or metal bars, suitable for being employed in the construction of ships' frames, and for other like purposes where such angle irons or bars have to be bent into angular or irregular forms, especially if they have to be bent in order to accommodate themselves to and lie against irregularly shaped forms. This object is effected by means of an ordinary hydraulic press mounted

on wheels or otherwise and connected by strong rods or pillars or by other suitable means to the "abutting frame."

In setting iron a suitably shaped die is inserted in the abutting frame, or two dies may be used with a space between them, and the ram, provided also with a suitable die, may operate between the parts where sharp bends and alterations in form are required. Corresponding dies of the shape of the bend or formation required to be obtained are inserted both in the ram of the hydraulic press and also in the abutting frame, and the angle or bar to be bent or shaped is placed between them, and by means of the press forced permanently to assume the required shape.

As in bending heavy bars of metal the strength of the machine may be overstrained and fracture ensue, "I propose according to " the second part of my improvements to attach the suction valve " of the pumps direct to a small cylinder or ram of somewhat " larger area than the area of the valve placed immediately over " it, and allowing this cylinder to go through the valve box with " the usual leathers to prevent leakage, and weighting it by means " of a spring lever weight or other suitable contrivance to the " extreme pressure the machine can safely stand; the suction " valve to be so arranged that when the ram is not pressed beyond " its safe limit the valve can fall up and down and admit more " water, and consequently more pressure as the pump acts, but " when once the limit to which the ram is loaded to is exceeded " the ram is forced out and lifts the suction valve from its seat.

"This part of my improvements is applicable for the purpose of " arresting the action of hydraulic presses employed for other " purposes at any given pressure when required, and suction " valve apparatus of this character may be applied to pumps used " for various purposes."

[Printed, 4*d*. No Drawings.]

A.D. 1866, October 31.—N° 2821.

WILLIAMS, Henry Headly.—(*A communication from John Gregory.*)—(*Provisional protection only.*)—" Improvements in " fastenings and backing for armour plates." This invention relates, firstly, to fastenings for armour plates, and consists mainly in constructing the bolts of wire rope. The outer end or head of the wire rope bolt, which fits into the armour plate, is made conical by driving a metal conical piece into the centre thereof;

and this conical head is then covered in a mould or otherwise with a cap of malleable cast or wrought iron, or other metal. When this wire rope bolt is driven tightly up, the inner end which passes through the inner skin of the ship or other structure is spread out to form an inner head by driving in a metal conical piece, the ends of the strands of wire being lapped over and round the end of the cone; the inner end is then tightly clipped by a split nut or a nut made in two pieces and formed with internal projections to take between the strands of the rope; an outer nut is then screwed over the split nut, the projections on which prevent this nut from turning with the outer nut, a washer is fitted between the outer nut and the inner skin, or the inner end of the bolt may be otherwise secured.

And, secondly, to backing for armour plates. This part of the invention consists in backing armour plates with wire of any desired form or shape, all the spaces or interstices being filled in with dissolved gutta percha and papier mâché, or other suitable material. It is preferred to make this wire backing in blocks to fit tight between horizontal angle irons placed between the armour plating and inner skin to prevent the wire backing spreading out, and the blocks of wire are immersed in a bath of gutta percha mixed with papier mâché, or in a bath of other suitable material; hydraulic pressure may be employed in this process.

[Printed, 4d. No Drawings.]

A.D. 1866, November 2.—N° 2839.

GREAVES, HUGH.—(*Provisional protection only.*)—"Improved "apparatus to facilitate the unloading and delivery of coal, stone, "and other articles from ships, barges, and other vessels." It is preferred to employ barges or other vessels, each having in the bottom thereof an aperture or apertures capable of being opened and closed, and so constructed that when the aperture or apertures are opened the coal or other article to be unloaded may fall out, and to have also at the delivery station a lighter furnished with a valve or valves, which being opened, the water enters the lighter so as to cause it to sink to the bottom of the river, canal, or other body of water in which it is situated. To unload the barges or vessels containing the coal, stone, or other article, they are brought over the lighter which has been previously sunk to the bottom, and the aperture or apertures above mentioned being opened, the

coal or other article which is to be unloaded is allowed to fall through the water into the lighter. The barge or other vessel is then removed, and when the tide has receded and the water has escaped from the interior of the lighter its valve is closed, and when the tide rises the lighter is floated and afterwards brought to its destination. In place of the lighter above mentioned a platform may be used made or iron or other suitable material having its under surface constructed at an angle with the upper surface, and this platform, when the material to be unloaded has been deposited upon it, is drawn by steam or other power up an inclined plane, so that its upper surface shall be level with or above the surface of an embankment, in order that the coal or other article to be unloaded may be transferred to bags, carts, or other receptacles for conveying it away. To facilitate the movement of the platform on the inclined plane, wheels or rollers may be attached either to the under part of the platform or to the inclined plane itself. Or, a platform may be used which may rest on and be attached to girders, the inner ends of which are hinged to the embankment, and the outer ends rest on a dummy which is sunk and raised by means similar to those used for sinking and raising the lighter above mentioned. When the tide raises the dummy and platform, struts may be placed under the moveable ends of the girders so as to support them, and the dummy may be withdrawn and used for other purposes without waiting for the unloading of the platform. In some cases a number of piles may be driven into the bed of the river, canal, or other body of water at the delivery station, so arranged and constructed that a barge or other vessel containing the material to be unloaded if brought over the same at high water would rest thereon, and be securely supported in position thereby, when the tide had receded, or when the water had been withdrawn; platforms, carts, railway wagons, or other receptacles might be then brought under the barge or vessel, and receive therefrom the coal or other article to be unloaded.

[Printed, 4*d*. No Drawings.]

A.D. 1866, November 3.—N° 2862.

GISBORNE, JOHN SACHEVERELL. — (*Provisional protection only.*)—" Improved automatic means and apparatus to give warn- " ing of the dangerous existence of fire in warehouses, ships, and " other structures and places." On breaking out of fire or dan-

gerous increase of temperature in warehouses, ships, and other structures and places, the fire or increase of temperature becomes the agent or inducing cause whereby electricity is made to give an instantaneous signal or signals, audible or visible, or both, to the person or persons in charge, or, "which I greatly prefer, to "the fire police at the nearest fire-engine station. I take two "metallic wires which are good conductors of electricity, and "place them close to each other; in this position I electrically "insulate them by or with gutta percha or other insulating "material liquifiable at low temperatures; I then lay, connect, or "fix the said insulated electric conductors on or to the ceilings or "other parts of structures, or through or amongst goods, thence "to the police office or other place where the signal is to be given. "I connect one or both of the said wires to a galvanic battery; "when one only is connected the electric circuit is not made, and "no current reaches the signal end. So soon, however, as the "gutta percha or insulating material becomes softened or melted "by increase of temperature the wires will touch each other, and "thereby allow a current to pass and operate the signalling appa-"ratus. When the ends of both wires are connected to the "battery then a current passes constantly through to the signal "end; in the event, however, of the wires touching each other, "then the circuit will be shortened, and so cease to reach the "signal end, at which time a signal will be given. Any ordinary "audible or visible signal or signals can be connected or used. "Instead of employing the insulated wires and making the touch-"ing each other of these the means of effecting the completing or "shortening of the electric circuit, I sometimes use quicksilver, "which I place in bulbs and tubes of glass or other suitable "material, and place these in different exposed places in struc-"tures or amongst goods. Any increase of temperature causes "the quicksilver to rise, come in contact with a conducting wire, "and complete an electric circuit so as to give a signal."

[Printed, 4d. No Drawings.]

A.D. 1866, November 7.—N° 2891.

DAWSON, THOMAS, and PALEY, JOHN.—(*Provisional protection refused.*)—"Improvements in sheathing vessels." The Inventors state that instead of sheathing vessels with copper, Muntz's

metal, or zinc, as now used, they propose to effect the same by applying galvanized iron.

[Printed, 4*d*. No Drawings.]

A.D. 1866, November 9.—N° 2919.

CASSAP, WILLIAM.—" Improvements in means for expediting " the putting out of ships' boats." It is considered that by these improvements boats can, in a rolling sea, be put out by one man and by one single operation, the rolling motion of the vessel being taken advantage of so as to assist that operation.

The improvements consist, firstly, in substituting for the ordinary chock upon which the boats rest a hinged chock supported in its position for holding the boat by arms or stays attached at one end by a joint to the hinged chock, and held in position at their other ends by means of a crank lever supported in bearings; two of these hinged chocks carry the boat.

And, secondly, in substituting for the ordinary davits an arrangement with rack and slide. A hollow beam carried on a stanchion or stanchions is placed athwart ships, and is provided with a rack, in this hollow beam is placed a sliding piece fitted at the outer end with sheaves, over which pass the tackles for carrying the boat. The hollow beam is slotted for nearly its entire length, and at each side of the inner end of the stand piece are two lugs which pass through slots to the under side of hollow beam, and there carry a roller which sustains the weight of the boat and sliding piece. When the boat is required to be put over the side a handle is turned, and by this one operation the lashings which pass over and secure the boats are at once cast free, and the arms or stays which support the hinged chocks removed, so that the chocks fall down. The weight of the boat is then sustained by the rack and slide arrangement, and if the ship be rolling the boat will by its own weight be carried out clear over the side by pulling on the sliding piece, and the return of the sliding piece is prevented by means of a pall taking into the ratchet of the hollow beam.

Should the boats be required to be lowered in smooth water, small outhaul tackles which are provided for that purpose can be used to pull out the davits.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1866, November 12.—N° 2952.

MURRAY, DIGBY.—" Improvements in apparatus to be used for " lowering boats." The invention, which has for its object the lowering of boats from steamers or other vessels with perfect safety whilst the steamer or vesse is in motion, consists in the general arrangement of the hooks attached to the slings, by which the boat is connected to the tackles.

The different parts constituting the apparatus are arranged as follows:—In lieu of employing a tumbler hook attached to the block, as shown and described in the Drawings and Specification of Letters Patent, dated 10th May 1866, granted unto Thomas Thornton (communicated by the present inventor) and numbered 1,347, common hooks are attached to chain slings coming up through one of the thwarts forward and the stern seat aft, having small check chains or ropes attached at one end to the upper part of the hooks and at the other to the bottom of the boat, so that when the chain slings are let go the weight of the boat coming on the check chains capsizes the hooks. The chains reeve through iron pins or rollers under the thwart and stern seat, and are then led forward and aft to the controller, the forward chain leading aft, and the after chain forward. By means of this arrangement both ends of the boat can be lowered and released simultaneously; the chain being fastened or released by a controller operated on by the rise and fall of a lever, or in any other appointed manner.

[Printed, 10*d*. Drawing.]

A.D. 1866, November 17.—N° 3013.

HURST, JOHN WITHERDEN.—(*Letters Patent void for want of Final Specification.*)—" Improvements in the method of placing, " stowing, and employing life rafts on board ship." " The inven- " tion, although applicable to life rafts or life boats generally, " has reference more particularly to life rafts of a particular con- " struction for which Her Majesty's Royal Letters Patent were " granted to me, dated the 30th of September 1865, No. 2,510, " and entitled ' Improvements in life rafts,' such life rafts " " being " more suitable for the object in view." The improvements consist in so placing the life rafts on board ship that they shall not occupy any of the useful deck space of the ship, but that they shall form a portion of or be attached to the waist or other part of the bulwarks or stern or quarters of a ship. By placing the life rafts

on the ship's side and attaching them to stanchions (securely fixed to the covering board and deck) by a single cotter or other easily detached fastening, they will always be ready in case of need for launching into the water in a few seconds. It is preferred to place the life rafts outside stanchions fixed within the line of the bulwarks of the ship, so that when triced up and secured in place they may be flush or nearly so with the outside line of the bulwarks. When the life raft is launched the whole of the space which it has occupied will be available for disembarkation from the ship. The raft is protected against collision by means of a continuous chock or nosing fixed outside the gunwale having two or more eyes or ring bolts sunk flush into it, to which the ends of a parbuckle or lashing may be secured, which taken over the raft and made fast to staples or belaying cleats attached to the stanchions or other convenient part of the ship, will assist in holding the raft firmly in its place.

[Printed, 4*d*. No Drawings.]

A.D. 1866, November 19.—N° 3033.

GRUSON, Jaques Hermann Auguste.—" Improvements in " armour plating for vessels of war, floating or land batteries, and " fortifications." The improvements consist in casting the iron armour plates in the required form, and giving to the surface the requisite hardness by employing chills or iron moulds.

The metal employed is a mixture of white and the best grey charcoal iron of a steely nature, free from impurities. In melting the metals in the cupola they are decarbonized to a certain extent by using a very powerful blast.

In carrying out the invention as applied to cast-iron plates for batteries or turrets, iron moulds of the required size and form are to be constructed and joined together so as to enable the plates to be cast in segments suited for coating or covering the external face of the battery or turret. The larger these segments can be made the better, as the thickness can then be increased, and the chilling can be carried deeper into the face of the plate.

The construction of mould and mode of casting employed are such that the molten metal first passes down a channel and then up into the mould. When the metal mould is filled the molten metal will run over at the top and fall into spaces made at the back of the mould, or behind the metal plates which form the

mould. By adopting this improved method of casting the cast plate will be prevented from cooling too fast, as the molten metal behind the mould will keep the latter hot, and cause the casting to cool gradually, and form a plate having hard surfaces and a strength and toughness not heretofore possessed by cast-iron plates.

[Printed, 8*d*. Drawing.]

A.D. 1866, November 20.—N° 3047.

BROOMAN, CLINTON EDGCUMBE.—(*A communication from Mayeul Bernabé.*)—" A new or improved process or method of " coating or covering iron and steel with copper or copper alloys." This process or method is based upon the employment of electro-metallurgy applied to cover iron and steel with a coating of copper or copper alloys, such as brass and bronze. The invention is applicable to the coating or covering of armour plates, rollers for cotton and other printing, boiler tubes and plates, engine fittings, gates, church fittings, lamp posts, and all iron and steel work in general. The process, by a peculiar action of neutralization of the electric currents, renders the articles quite inoxidizable. It comprises three operations, and three water-tight vessels of suitable size for the immersion of the articles to be coated are all that is required; these vessels may be of wood when the articles to be coated are of small size, they should be of masonry (Portland cement and bricks) when the articles are more than about three feet long and five inches wide.

The operations are as follows:—The iron or steel article to be coated is immersed in a vessel containing water acidulated with sulphuric acid to 2 degrees Beaumé, in which it remains for about six hours. The article is then taken out, rinsed with fresh water, and rubbed with sand and water rendered slightly alkaline with carbonate of soda to neutralize any little acid which may remain in the pores of the iron; this accomplished, the article is again rinsed with fresh water.

2. The article to be coated is placed into an alkaline bath formed by cyanide of potassium, in the proportion of about 6 ounces of cyanide of potassium to 1¾ pints of water, and about 1¼ ounces of carbonate of copper. Facing the piece of iron or steel called " catode," and on each side of it, is placed a plate of copper called " anode;" these two plates ought as much as

possible to present a surface equal to that of the article to be coated. As the bath ought not to be worked until it is completely saturated with copper, the desired saturation can be obtained without waiting for the destruction of the anodes to give it the necessary strength, by dissolving a sufficient quantity of carbonate of copper in the bath. For this purpose some sulphate of copper is dissolved in as little water as possible, and in another vessel some carbonate of soda; when these two bodies are dissolved the carbonate of soda is emptied into the solution of sulphate of copper, and thus a double decomposition is obtained, giving carbonate of copper and sulphate of soda; the mixture is then passed through a filter, at the bottom of which the sulphate of soda is precipitated together with the "excess water;" the carbonate of copper is then collected, washed, and next dissolved in the cyanide of potassium. The baths of brass and bronze are obtained in the same manner, substituting for one part of the copper such proportions of zinc or tin as will give the desired result, according to the shade to be obtained. One or more brass slips holding the catode reach out of the bath to be joined to the positive conducting wire of an electric battery or pile working for this first bath. This battery, the number of elements of which varies according to the intensity required to be given to the electric current, is preferably that of Bunsen, modified by Archaud, with the object of obtaining the strongest or greatest amount of electricity. The negative conducting wire is fixed to the rods supporting the anodes.

Description of the Pile.—A cylinder of zinc is placed in a china or earthen vessel containing water slightly acidulated with sulphuric acid; in the middle of the cylinder is placed a porous vessel; in this porous vessel is a piece of graphite, rather higher than the height of the vessel; in this vessel nitric acid is placed; a rod or piece of copper is rivetted upon the upper part of the zinc cylinder; a similar rod or piece is fixed on the extremity of the graphite. A battery is set in motion by joining the two poles by small copper conductors. A brass wire is fixed at the end of the series by a pressure screw upon the appendix of the zinc cylinder, and then conducted to the clip of the catode, to which it is attached by a pressure screw. A brass wire is also fixed to the appendix of the graphite, and thus establishes a current to the rod from which the anodes are suspended; thus the cyanide of potassium attacks the copper, dissolves it, and by the effect of

the pile carries it in a metallic state on to the catode. The bath is kept up thus, and the copper of the anodes being dissolved becomes deposited gradually upon the catode; five minutes in this bath after the current has commenced to act are sufficient to entirely cover the piece of iron or steel (catode) with a coating of copper sufficient to entirely isolate it. In this operation, the iron or steel being preserved from oxidation by the bath, which has an alkaline character, receives the copper in a metallic state into all its pores.

3. The iron or steel are submitted to treatment in a second bath; this bath is formed of sulphate of copper dissolved in water, as much as the water can dissolve. The piece to be coated already isolated by a first coating is immersed in this bath, and in forty-eight hours receives a coating of about a millimêtre or $\frac{1}{25}$th of an inch over all its surface.

The electric current is obtained for this second bath by means of a direct pile formed of diaphragms or porous vases, into which are placed plates of zinc which, as in the first bath, should face the piece to be coated and present a surface equal to that piece. The pieces of zinc should have been previously cleaned in acidulated water and amalgamated with mercury and a little hydrochloric acid. In the diaphragms is placed a certain quantity of water acidulated with sulphuric acid, which attacks the zinc and slowly dissolves it. At the end of each of the pieces of zinc immersed in the diaphragms, pieces or rods of copper are fixed, united with the rod of the same metal crossing the vessel, and to which are attached the clip, which as in the first bath holds the iron (catode), forming thus itself another pole of the pile. This second bath must be kept up at a proper degree of saturation. For this purpose a portion of the liquid in the bath may be taken out, but in such a manner as not to interrupt the current. This liquid is poured into a vessel and heated, and in its place a certain quantity of sulphate of copper which by the heat is dissolved with greater rapidity; this solution obtained, the saturated liquid is poured into the bath; this operation must be repeated as often as the state of the bath or the degree of saturation requires it. The iron or steel article on being taken out of this second bath is washed in fresh water, and the process is then terminated. To facilitate saturation a certain quantity of sulphate of copper in bags can be left in the bath. It is thus dissolved and keeps the bath permanently in a state of saturation. The Bunsen pile and anodes can

be employed for the second as well as for the first bath. For the second bath and for coating some articles diaphragms of sail cloth or canvas and porous earthen cells are used. When an article has been already submitted to the first bath, and is being coated in she second, the currents which are used for the second bath can be utilized to produce by their transmission the reproduction on a new article immersed in the first bath, and so on for the continuation of the operation. By this simplification a saving is effected of one or even several galvanic piles, while the two baths are acting simultaneously.

[Printed, 4d. No Drawing.]

A.D. 1866, November 22.—N° 3067.

McCOMAS, THOMAS.—(*A communication from Samuel William Maquay.*)—(*Provisional protection only.*) — " Improvements in " raising sunken vessels." To facilitate the raising of sunken ships or vessels in deep or shallow waters the inventor employs the generation and expansion of hydrogen or other aeriform gases within any suitable apparatus, by the agency and buoyancy of which the said ships or vessels are raised. He places a number of bags or like receptacles (rendered water-tight by a coating of gutta percha or otherwise) in the hold, or otherwise attaches them to the ship or vessel by a strong network of cord, proportioned to the size and weight to be raised. These bags are then inflated or charged with hydrogen or other light gases.

[Printed, 4d. No Drawings.]

A.D. 1866, December 3.—N° 3176.

HERMANN, AUGUST, and BRETHAUER, HENRY.—"Im-" proved apparatus for discharging bilge water from vessels' holds." This invention relates to the construction in the bottom or bilge of a ship or vessel of a circular-shaped apparatus with a vertical axle reaching to the deck of the vessel, by the rotation of which apparatus water accumulated in the vessel will be forced out. Over an opening in the bottom of the vessel is fixed a casing closed at its upper part, but open at bottom. In this casing is mounted a vertical axle, which is driven by any suitable motive power; at one side the casing is fitted with a vertical slide which moves in grooves, and is intended to open or cut off communication between the hold of the ship and the casing; behind this slide is a hinged

valve opening inwards; on the axle there is permanently fixed a hollow cylinder which turns with the axle, and on its circumference it has three openings communicating respectively with three projecting chambers, each of which chambers is provided with a valve so arranged that the valves will open (outwards) when the hollow cylinder is turned, and remain closed when the cylinder is at rest. This apparatus is used in the following manner:—When water has accumulated in a ship provided with this apparatus and is required to be removed, the slide is raised and the axle is put in rapid rotation, whereby the hollow cylinder with its projecting chambers will be rapidly rotated and caused to act like a centrifugal pump, throwing open the valves and forcing out the water through the same, and out at the bottom of the casing. When all the water is thus removed from the vessel the slide is lowered and the rotation stopped.

[Printed, 10*d*. Drawing.]

A.D. 1866, December 10.—N° 3249.

NANGLE, Walter Chidiock.—" Improvements in armour " plating or protecting vessels of war, forts, and other like struc- " tures, and in the manufacture of the plates and material " employed therein." The invention consists mainly in placing the armour or protective plating in vessels of war, forts, and other like structures inside an outer protection so that the armour plating does not receive the first impact of shot or shell; also in the manufacture of the armour plates with knobs or excrescences on the outer face, in the manufacture of other outer plates of a peculiar form, and in the manufacture of a composition.

" Against the timber or skin of the ship or other structure I " place a cushion or pad of horsehair, soft malleable iron, or other " suitable yielding material, against this cushion I place the " armour plating. The armour plates are constructed, say, three " inches thick, more or less, having on their outer face knobs or " excrescences of, say, four inches thick, more or less, these knobs " being at such distances apart that a shot or shell must strike " one or more of them, and not directly, upon the flat portion of " the plate; this method of construction gives the strength of " a seven-inch plate with a three-inch plate having four-inch " knobs or excrescences," and the force of a shot or shell is also spread over a larger surface of the plate. Against this armour

plating the inventor sometimes places a composition of, say, 8 inches, reckoning from the top of the knobs or excrescences. This composition may be formed of hides cut into small pieces before being tanned, mixed after tanning with marine glue or other binding material, and pressed into blocks by powerful hydraulic pressure. "Outside the composition (or when it is "dispensed with outside the armour plating) I place a second "cushion or pad of horsehair or other yielding material, and "outside this cushion I place two layers of rings or flat plates "formed with circular apertures; these rings or plates are set "vertically, and the two layers are separated by wire netting or "other material to which they can be readily secured; they are "arranged so that the rings of the back set are behind the space "between those in the front set. The upper parts of the rings or "plates are attached to the wire netting by string or other material "which will readily break, while the lower parts are attached by "strong wire, so that when a shot strikes against and enters a "ring, the upper attachment may break, and the shot is thereby "deflected downwards. The rings are about $4\frac{1}{2}$ inches in "diameter, and tapered to correspond with the form of an "elongated shot. (Sometimes I dispense with these two sets of "rings or flat plates and wire netting, and sometimes also with "the second cushion.) Outside these two set of rings or plates I "place steel or other metal plates formed on their outer face with "projections tapered or bevilled at the extremity, and curved in "an upward direction at an angle of about 28° or 30° for the "purpose of causing a shot on striking them to deviate downwards "from its proper direction. These projections are formed on "their upper side like a rasp, so as to hold or bite the lower "portion of the shot; they are, say, about 6 inches in length, "and the plates to which they are connected are, say, $2\frac{1}{2}$ inches "thick immediately below each projection, while they gradually "diminish in thickness to the next following projection. The "spaces between the projections are filled up with wood, or the "composition before described, or other suitable material, and "should not be far enough apart to allow a shot to enter between "them.

"The inner cushion, the armour plate with knobs or excrescences, the composition, the outer cushion, the rings or plates "with circular holes, the plates with the curved tapered projec- "tions, and the filling pieces between these projections are by

"preference placed in metal boxes of, say, five feet square, which "boxes are dropped in between the timber or skin of the ship or "other structure, and an outer skin of timber or other material "which forms the outside of the structure. When any portion is "injured the box or boxes containing that portion may be lifted "out and replaced by others; or the parts before described may "be secured with or without the boxes to the ship or other struc- "ture by bolts or other fastenings in any ordinary manner, the "whole being covered with an outer skin of timber, whereby "corrosion is entirely avoided."

[Printed, 8*d*. Drawing.]

A.D. 1866, December 13.—Nº 3276.

GRELL, JOHANN HEINRICH.—"Improvements in the construc- "tion of steam ships, sailing ships, boats, and other vessels, for "sea or inland navigation, the said improvements being for the "purpose of facilitating the quick steering or manœuvring of "such vessels." "The improvements consist in so constructing "the keel of vessels that in it are formed square or other shaped "openings, and in one or more or all of these openings I swing "a rudder or rudders, the vertical spindle or spindles of which "pass upwards into the vessel, and may be there operated by "hand or by hydraulic or steam steering gear. The rudders "may be worked independently or may be geared or worked "together. I propose to use these rudders either in substitution "for or in addition to the ordinary rudder; I also propose to use "the openings in the keel with or without the swinging or other "rudders therein; the object of using the openings in some cases "without the rudders being to lessen the resistance to the vessel "quickly turning round."

[Printed, 10*d*. Drawings.]

A.D. 1866, December 14.—Nº 3291.

BERNEY, THOMAS.—"Improvements in apparatus for bending "bars and plates of metal." For the purposes of this invention a roller is mounted in suitable stationary or fixed bearings; to this roller a lever frame is applied in such manner as to admit of the lower end of such lever frame moving freely thereon, or the lever frame may move on its own axis; this lever frame carries a second roller with its axis parallel to the axis of the first mentioned

roller; or such frame may carry two rollers on opposite sides of its axis, or otherwise, and in such manner that these rollers or either of them may be adjusted to and from the first-mentioned roller, or from each other, both horizontally and vertically, and otherwise. To the upper end of the lever frame is attached the upper end of a bar by pin-jointing or otherwise, but in such manner as to admit of the position of the points of attachment between the upper part of the bar and the upper end of the lever frame being varied or adjusted. The lower end of the bar is arranged to be moved from and to the stationary or fixed bearings of the axis of the first mentioned roller by steam or other power. One end of a bar or plate of metal which is intended to be bent is fastened to the lower end of the bar when such bar is near the fixed bearings of the first mentioned roller, or in any required position removed from them, then on the lower end of the bar first mentioned being moved away from such fixed bearings, the plate or bar of metal to be bent is drawn through between the rollers, whilst at the same time the lever frame is caused to move from its upright position more and more towards an horizontal position, and in so doing it causes the moveable roller or rollers to press more and more upon the bar or plate of metal which is being bent. By the adjustment of the positions of the moveable roller or rollers, and of the lever frame, or of either of them, the nature of the bend or curve produced will be varied. In some cases the apparatus is arranged so as to be adjusted as the bar or plate to be bent is passing between the rollers. The vertical position of the plane in which the apparatus acts, though preferred, is not essential. In some cases, particularly when the bar or plate has a flange or flanges, an auxiliary roller or rollers is or are used to act on the flange or flanges or other parts of the bar or plate, and in place of employing the bar above-mentioned, the lever frame may be otherwise connected with and acted on by the steam or other power employed. In some cases the axis of any other roller or rollers carried by the lever frame or otherwise, may be geared with and driven from the axis of the stationary roller, in which case when bending a bar or plate by the pair of rollers, such plate or bar in place of being drawn between these rollers will be moved by them, and the requisite bending when the lever frame is depressed will be by the plate or bar being supported so as to resist the action of the upper or under or of both of the pair of rollers. In place of the roller carried by the lever frame being

above the stationary roller, the positions of the parts may be reversed or changed, also the lower roller may be made use of. In some cases also the stationary roller is dispensed with, whilst the lever frame carries two rollers, the bar or plate resting on a support when being bent by the rollers carried by the lever frame. The roller frame with its adjustable rollers may in other cases be mounted in the stationary or inadjustable bearings, while the lever frame will carry the depressing roller.

[Printed, 1s. 10d. Drawings.]

A.D. 1866, December 18.—N° 3321.

GRAY, JOHN MCFARLANE.—"Improvements in steering apparatus, referring to a steering telegraph and rudder indicator and "a steam steering engine." The invention consists of two parts, the first part refers to a steering telegraph and rudder indicator, and the second part refers to a steam steering engine.

The term rudder indicator is used for that portion of the apparatus which in ordinary steering is worked by the rudder to record the actual position of the rudder; and the word telegraph, as a name for that portion of the apparatus which is worked by the man at the bridge, or at the position of governance to prescribe the required position of the rudder.

Heretofore such apparatus has been constructed with two sets of connections, one for telegraphing from the bridge to the rudder, and the other for indicating the actual position of the rudder. According to this invention these are so constructed as to form but one machine, and the medium of communication between the bridge and the telegraph aft forms also the medium of communication between the rudder and the dial at the bridge.

The principal object in view in this part of the invention has been to contrive an efficient telegraph to answer all the requirements of steering by men, and at the same time to be applicable to steering by steam power without alteration in the working of the telegraph, and without the intervention of a man between the person at the telegraph wheel and the steam steering engine.

"In constructing a steering telegraph and rudder indicator "according to this invention I carry a line of small shafting in "any convenient way from a hand wheel, called the telegraph "hand wheel, at the bridge, to a telegraph dial aft placed near the

" helm. A piece of the shafting at the telegraph aft is a screwed " shaft, which I will suppose to be a vertical shaft, it works in a " nut, and is free to move a certain distance in the direction of " its axis by revolving in the nut; this nut is attached to or is " cast in one piece with a wheel, or the nut is formed in the eye " of the wheel, and the nut and the wheel turn together in a bear- " ing, and are provided with collars to prevent longitudinal motion. " This wheel is connected either directly or by intermediate " gearing with a wheel, which revolves along with the steering " wheel shaft, so that the nut turns only when the steering wheel " shaft is turned. The screwed shaft," passing through the nut, " is provided with two stop clutches, one at each side of this nut " wheel; the position of these clutches is such as to limit the " longitudinal traverse of the screwed shaft to, say, one turn of " the screw each way, or two turns altogether, and they catch " into corresponding projections on the ends of the nut when the " screwed shaft has moved through its assigned distance in either " direction. These projections are stops to the motion of the " screwed shaft, when that motion has been imparted by working " the wheel at the bridge, and they are," also " drivers to com- " municate the motion of the steering wheel shaft to the screwed " shaft and telegraph shafting. The screwed shaft carries a piece " containing a turned groove, and a sliding block lies in this " groove. A pin in this block is attached to a lever," called the " traverse lever, so that the longitudinal motion of the screwed " shaft is imparted to the traverse lever, but when the screwed " shaft merely revolves with the nut, and has no motion endways, " the traverse lever remains stationary. By this traverse lever I " control the motion of" the steam steering engine.

" I have already described the screwed shaft as a vertical shaft " driven from the bridge by the telegraph shafting, and I have " described a wheel and nut as being on this screwed shaft; I will " now explain how I work the telegraph signals at the helm. On " the screwed shaft I fix a small spur pinion, and on the nut I fix " another similar pinion; from these I drive two small vertical " shafts, one upon each side of the screwed shaft, so that one of " these" small " shafts is driven by the telegraph shafting, and " the other by the wheel on the steering wheel shaft. At the " upper end of each of these shafts I have a worm, gearing each " into separate toothed" arcs or quadrants, " which are carried

" on the same centre, but work independently of one another.
" These worms or endless screws have their threads, the one
" right hand and the other left hand, and the toothed arcs or
" quadrants have each an index arm or pointer. The index arm
" of the arc, which is moved by the steering wheel shaft, is in one
" piece with that arc, and indicates on a graduated fixed dial the
" actual position of the rudder. This index arm I call the rudder
" indicator. The index arm of the arc which is moved by the
" telegraph shafting is jointed to both quadrants; the distance
" between the centres of these joints is short as compared with
" the length of the index arm, so that any difference in the motions
" of the two toothed quadrants is shewn as magnified at the point
" of this jointed index arm, and the steersmen at the steering wheel
" are thereby directed to put the steering wheel over to the side
" towards which this index arm points: it travels over a graduated
" scale formed on the index arm of the other toothed quadrant.
" This jointed index arm I call the telegraph director; it points
" to the side to which the wheel has to be turned, and by its
" position shows how much the wheel at the bridge is in advance
" of the steering wheel, and thus intimates that the steering wheel
" should be moved faster or slower to keep pace with the move-
" ment of the telegraph hand wheel at the bridge.

" It will be understood from this description that the differential
" motions of the screwed shaft and nut wheel relatively to each
" other produce similar differential movements of the two toothed
" quadrants relatively to each other, and that any difference
" between the movements of these two toothed quadrants is
" shown enlarged by the telegraph director on the graduated scale
" formed on the rudder indicator. When the wheel at the bridge
" corresponds with the actual position of the rudder the telegraph
" director will point to the centre of the rudder indicator arm,
" and that will then be the required position of the rudder."
" When the wheel at the bridge is moved in either direction, the
" telegraph director will advance in the corresponding direction
" beyond the centre of the rudder indicator, and will remain in
" advance until the actual position of the rudder corresponds
" with the required position, and then a telegraph index at the
" bridge, the rudder indicator at the stern, and the telegraph
" director will all point to the same position for the rudder, and
" the telegraph director will be central upon the rudder indicator."

"In addition to this I fix a bell and hammers on the upper end of "the screwed shaft, and I fix a projecting pin on the nut wheel, "so placed as to give signals of warning, and, if required so "arranged as to strike repeatedly for the signal of urgency."

"A telegraph index at the bridge or place of governance is "worked off the telegraph shafting," so that the position of the telegraph index will correspond exactly with the motions of the telegraph wheel, but it will be always in advance of the actual position of the rudder while the rudder is being moved to orders, and behind the actual position of the rudder when it is being moved by the sea or against orders, and will exactly agree with the rudder in position when orders given have been obeyed. "At "the bridge shaft, which is a small horizontal shaft, I provide "stops for the extreme positions of the rudder, namely, for hard "over port and hard over starboard." "At the bridge I connect "the telegraph hand wheel to the shaft there by means of a "safety clutch arrangement. The clutch is in two pieces and "the hand wheel is fixed to or formed on one of those pieces, it "bears at one side upon a ring collar which is fixed on the end "of the shaft, it is itself free upon the shaft; a journal is "formed on this clutch piece, and a pedestal under this journal "supports that end of the shaft; upon the other side it is in "contact with the other clutch piece, and their driving projections "there have inclined faces. This second clutch piece is seated "on feathers on the shaft, and can slide longitudinally on the "feathers, and to transmit any force these two clutch pieces "require to be held firmly together or they would be thrown "out of gear by the action of the inclined driving faces." "They "are held in contact by a spiral spring on the shaft bearing on "the second clutch piece, and compressed by a nut and screw "also upon the shaft. The two clutch pieces and the spiral "spring are thus held firmly together between the ring collar "above referred to and this nut upon the shaft, and the force of "the compression of the spring can be so regulated by the nut "according to the inclination of the faces of the clutch pieces "and to the force which it will be safe to transmit through the "shafting, that the clutches will part before any undue strain can "be put upon the shafting, and the telegraph hand wheel will "then revo ve without moving the shafting, and will thus inti- "mate to the man in charge that the full signal has been given,

" and has not been executed, or that the rudder is hard over."
" This is the arrangement of safety clutch by which I protect the
" telegraph shafting from undue strains."

" When the rudder is moved in opposition to the signal from
" the bridge, as when a sea strikes the rudder, the motion produced
" will first cause the rudder indicator toothed quadrant to move
" in the same direction as the rudder, but as the telegraph shaft-
" ing is stationary, the telegraph director will move in the oppo-
" site direction, and when it has just reached the full signal for
" correcting the contrary motion of the rudder the stop clutches
" on the screwed shaft and on the nut wheel will have come into
" gear, and if the contrary motion of the rudder is continued
" beyond this point, motion will be then imparted to the telegraph
" shafting, and the telegraph index on the bridge will indicate a
" position a little in the rear of the actual position of the rudder."
" The man at the telegraph hand wheel will not resist the move-
" ment of that wheel when that is caused by the contrary motion
" of the rudder," but will wait until its motion has just stopped, and then move back the telegraph index to the position he requires the rudder to occupy.

The description here given of the steering telegraph and rudder indicator applies whether it is worked in connection with a steering engine or only with manual power at the steering wheels. But if it is in connection with the steering engine the contrary motion of the rudder would at once turn on the engine power to correct that motion, and therefore the telegraph hand wheel at the bridge would, as a rule, only move when operated by the man in charge thereof; but all the while even minute variations of the rudder would signal for their own corrections at the telegraph dial aft, and by means of the traverse lever the differential motions produced would be communicated to the starting lever of the steering engine, which would respond to those signals and restore the rudder to its required position without the intervention of any attendant either at the bridge or at the stern. The steering engine acts under these circumstances as a yielding but powerful brake, and restrains the rudder into its required position, acting of its own accord within the limits fixed by the traverse of the screwed shaft.

The second part of the invention refers to a steam steering engine, and what is new is the arrangement of the parts so as to put the engine, which is placed at the stern, entirely under the

control of the man at the bridge, and to make it self-acting so as to keep the rudder in any required position, or to restore it to that position within certain limits as above explained against the action of the sea, and adapting the engine so that it may be actuated by the telegraph gear above described, and in several of its details providing for its efficient working as a special steering engine. "To accomplish this I construct an engine with two "cylinders," "with their steam and exhaust passages and slide "valves so arranged that the direction of the steam or of the "exhaust can be reversed by moving a special admission or stop "valve into one or other of its positions. I attach this admission valve by suitable connections to a part of the telegraph "gear described in the preceding part of this Specification, and "there designated the traverse lever, which receives its motion "from the screwed shaft therein also described, and I thereby "open this stop valve according to the longitudinal motions of "that screwed shaft, so that the position of this stop valve with "reference to its whole travel will always correspond with the "position of the screwed shaft with reference to its longitudinal "travel, and it will agree in its positions also with the positions "and indications of the telegraph director. There is a spur "pinion on the engine shaft gearing into a wheel on the steering "wheel shaft of such relative diameters as will permit the engine "to move at an advantageous velocity while the steering wheel "shaft rotates at a slower and more appropriate speed." "I "construct the engine shaft and its pinion so that the pinion "can be slid on feathers on the shaft to take it out of gear with 'the steering wheel shaft, so that if the steering wheel shaft is "also fitted with steering wheels, as usual, the rudder can be "worked either by steam power or by hand, or by both, as is "required, the telegraph and indicator remaining in use in either "case."

In these self-acting steering engines in order to prevent the accumulation of water in the cylinders, which are placed horizontally, the steam passages between the cylinder and the exhaust pipe are formed with a fall or descent from the cylinder to allow water to drain away.

It will be understood that "to operate the steering engine and "to signal at the stern I produce a longitudinal traverse motion "corresponding to the difference between the motion of the telegraph hand wheel and the motion of the steering barrel shaft

" by the intervention of a geared nut and screw between the " steering barrel shaft and the telegraph hand wheel." There may moreover be "two modifications of my invention. In each " of these I use a screw and a nut " to produce differential traverse motion, and in each the nut gets its motion from the steering barrel shaft as in the first arrangement, but the details are varied to adapt them to other means of communication between the bridge and stern.

According to one of these, water or other fluid is used as the transmitter between the apparatus at the bridge and the machine at the stern; and in the other the connexion between the bridge apparatus and the stern apparatus is rope or chain, or rods with chain and rope. The details in both these cases are described by the inventor.

Also, instead of the shafting first described, a rotary motion may be communicated to the differential screw by a single or double rope or chain led from a pulley or a barrel at the bridge. Or a differential longitudinal traverse motion suitable for controlling a steering engine, such as that described, can be produced by using a train of three spur wheels, driving one of the outer wheels by telegraph shafting from the bridge, and driving the other outer wheel from the steering barrel shaft. The two outer wheels should have fixed centres, and the middle wheel should have its centre fixed on the end of the traverse lever, or connected to it, so that when the traverse lever is in its middle position the centres of the three wheels will be in a straight line, then, when the telegraph shaft is moved in either direction in advance of the rudder steering barrel shaft, the middle wheel will be rolled to some extent over the other wheel, and will thereby carry its centre beyond the straight line joining the centres of the two outer wheels, and thereby give the required motion to the traverse lever.

On the steam pipe and below the cylinders of the steering engine " I form a separator to intercept any water of condensation, " and such water is discharged by a trap. It will be obvious that " the steering engine can be used without the telegraph, and the " telegraph without the engine; that instead of connecting the " steering engine directly to the steering apparatus the motion " can be conveyed by intermediate gear to allow of the engine " being placed in any convenient position, for instance, in ships " of war below the water line, and that the engine shaft can be " formed on or be an extension of a shaft of the steering apparatus.

"The differential motion herein described may be adopted "in the construction of steering engines for manœuvering "war turrets or heavy ordnance. It will also be obvious that "instead of steam any other power fluid can be employed."

[Printed, 2s. 8d. Drawings.]

A.D. 1866, December 20.—N° 3348.

PARRY, SAMUEL.—"An improved composition for the coating "of the bottoms of ships and other vessels." The improved composition is applicable to ships or other vessels constructed of either wood or iron for protecting them from the formation of barnacles and from other accumulations.

The ingredients and proportions preferred are as follows:—20 gallons of palm oil; 2 gallons of boiled linseed oil; 14 lbs. of arsenic; 6 lbs. of red lead; 6 lbs. of dryers, preferring that description of dryers commonly called patent dryers; 4 lbs. of oxide of iron. Of these the boiled linseed oil, arsenic, red lead, dryers, and oxide of iron are first mixed together, and then with the palm oil when that oil is in a boiling state, and the whole is then well mixed together.

The application to the ships' or vessels' bottoms should be when the composition is in a boiling state. Before applying the composition it is preferred to give the bottom of the ship or vessel two coats of zinc white, with which has been mixed a small quantity of oxide of iron. About two coats of the composition may then be applied.

[Printed, 4d. No Drawings.]

A.D. 1866, December 20.—N° 3352.

WHITBY, TIMOTHY.—"Improvements in the construction of "vessels of war and other structures requiring to be rendered "shot-proof." "In constructing vessels of war according to this "invention I coat or plate the exterior of those parts of the skin "of the vessel that are required to be rendered shot-proof with a "combination of wrought plate and chill cast metal, the wrought "plate being employed for the purpose of enclosing and retaining "in position the chill cast pieces. I prefer that the chill cast "pieces should be cast of a cylindrical form, and that they should "be secured side by side on the exterior of the vessel by the "wrought plates, which I prefer to bend to an S curve, so that

"one portion of each curved plate may overlap one cylinder of "chill cast metal, and the other portion pass behind the chill cast "cylinder next to it; the chill cast metal will thus be entirely "surrounded and enclosed by the wrought plates. The wrought "plates may be secured to the side of the vessel in any suitable "manner. Other structures requiring to be rendered shot-proof "may be coated or plated in a similar manner."

The Drawings shew three modes in which blocks of chill cast metal may thus be combined with wrought-iron plate for protecting those parts of the skin of a vessel that are required to be rendered shot-proof. These modes of construction are the same as those referred to in the Specification to a former Patent granted to the same inventor on the 29th August 1866 (N° 2223), the blocks of chill cast metal being in each case so formed as to offer deflecting surfaces to shot impinging upon them.

[Printed, 10*d*. Drawing.]

A.D. 1866, December 20.—N° 3355.

NEWTON, Alfred Vincent.—(*A communication from Charles James Eames.*)—"An improved compound for coating ships' "bottoms and other surfaces." This invention relates to the preparation of a composition which is known as "Eames' compound paint," and is particularly intended for coating ships' bottoms, but can be used for coating woodwork or iron of any description, which from being exposed to the action of salt or fresh water is liable to become foul or perforated by worms. It is also intended to prevent the growth of vegetable matter, marine shells, and worms in the bottom of wooden or iron vessels, and on all wood or iron substances exposed to the action of salt or fresh water. The composition is made of asphaltum, naphtha, carbolic acid of ninety-five per cent. purity, red oxide of mercury, and white arsenic, and the ingredients are mixed together in or about the following proportion:—Asphaltum, seven pounds; naphtha, four pounds; carbolic acid, ninety-five per cent. purity, three-quarters of a pound; white arsenic, one quarter of a pound; red oxide of mercury, two ounces. The requisite quantity of asphaltum is taken and heated until it is melted, and then enough naphtha is added to give to the mixture the consistency of paint when cool. After this mixture has become cool add a preparation of the remaining ingredients, which are mixed together and ground

to the consistency of paint, and then mixed or added to the other mixture. The preparation thus obtained is stirred into the first mixture, and when both are thoroughly mixed the composition is ready for use.

[Printed, 4d. No Drawings.]

A.D. 1866, December 20.—Nº 3357.

LUNGLEY, Charles.—"Improvements in war ships, forts, "guns, and armour, and in fitting and working them." "I fit "ships of war with moveable prows or spears made to house when "not required for use; these prows or spears I fit with one or "more pistons in trunks or tubes with pumps to force the pistons "in or out, and to get pressure to resist the force to be acted "against. I fit valves to the tubes or trunks to withstand dif- "ferent degrees of pressure so that the blow may be eased and "not exert more force than the tube can bear. The pumps are "so arranged that they will act on the opposite side of the piston "so that the spear or prow can be drawn out from any object and "house itself." "In these ships or forts I fit shot-proof coamings, "and from these I carry up trunks or masts made self-supporting "and diminishing in diameter and thickness to the upper end; in "these trunks and masts I fit tubes to be used to get a reverse "current of air; I also fit them with ladders and platforms for "conning, for riflemen and others; these may be made to hinge "or lower in part or in whole. When used as a mast I fit the "gear so as to work the canvas from the inside when required, "and fit half yards or gaffs which are hinged and jointed so as to "lower alongside the mast, and fitted on a ring so as to work "round the mast; or I also fit other rings round the mast to "secure the canvas so that the two sails may make or act as a "square sail; the sails are also made so that they may be reefed "from the inside of the masts."

"Where I fit a balanced or other form of rudder to work with- "out the ordinary pintles and braces I make a slot in the keel "or in the part giving support to the rudder. I fit a stop or "T pintle with a joggle to work under the keel or supporting "piece; to ship this into place I put the rudder out of position "and drop the T piece and pintle through the slot, and when the "rudder is put into proper position the T piece is across the slot "and works under the supporting part and keeps the rudder from

" unshipping; in this case I make the pintle large and cover it " with wood or metal to keep it from wearing away; I also fit to " the rudder post pins to keep it from working over too far; in " some cases I fit these rudders, or part of them, with elastic " material fitted in a groove with projecting arms as a guide, and " rods and pulleys with chains to lead inboard or up the rudder " post so as to act upon the after part of the rudder; in this case " I make the after part of the rudder thicker."

"In placing and working the guns in ships, forts, and batteries " I fit trunks either moveable or fixed; when fixed I prefer to " make them of a taper form so as to allow of training for the " gun; in these trunks I fit elastic tubes of a conical form, or " otherwise, to allow the guns to be worked through them in any " weather, and made to be self-closing when the gun is inboard; " to these elastic tubes which form valves I fit supports so as to " keep them in form, and I hinge these supports and secure them " and the valves to the sides of the trunks; these valves are also " made sufficiently strong to resist rifle bullets." "In some cases " I make the valve to hinge or slide up, and I also fit a stuffing " box round the gun secured to the sides of the ship or trunk. " In these valves when the guns are not required to be in position " I fit scuttles and gratings so as to give light and air; these " valves I also propose to fit to the ordinary ports or openings for " guns. In some cases I fit moveable trunks so as to guide the " missile until it is clear of any substance near the mouth of the " gun. Where the guns are placed near the water I fit a valve to " the inside of the gun with a rod reaching to the projectile so " that the valve will clear the gun the instant the explosion takes " place. In some cases I fit the openings for guns with a sphere " of iron or elastic material so as to enable the gun to be fired, " and at the same time to form a port stopper; this may also be " used with advantage for small arms." "When I fit part of a " sphere or circular fort or port I work it on a pivot or wheels, " and by turning it round according to the distance or width of " opening in the side I bring the opening for the gun inside of " the ship or fort so as to protect the men when loading or other- " wise. When I cannot get room for a pivot for training the guns " I fix a bar or guide (as it were) to form the inside of a large " pivot, and this I fix to the sides or platform, and inside the bar " I place wheels to act as guides to the gun slide for training the " gun, and keeping the centre of training near the outside of the

" side of the ship or fort; this plan can be used for any carriages. " I also fit a large screw or screws to the slide in preference for " working out the gun, and I connect a nut or nuts, or a rack or " racks, to the carriage so that by connecting the screw to a cap- " stan or any other apparatus to give power of turning the screw " the gun may be worked out to the desired position. The nut " or nuts I make in two or more parts, and when the gun is out " I separate the parts by screws connected to the half nuts, and " thus release the screw, and leave the carriage free for the recoil " of the gun, the nuts are then closed, and the gun can be worked " out again." "I also, where practicable, fit a balance weight " connected to strong springs or buffers, or hydraulic gear, so as " to keep off any sudden jerk; I secure these springs, buffers, or " gear to the weight by means of rods, chains, or ropes, and I thus " husband the force given by the recoil so as to use it for working " out the gun. I make the guns for these ships, batteries, and " forts to load at any distance from the muzzle, and I fit them " with lugs or flanges to receive bolts, pins, screws, or clamps, " and I stop the opening in the guns by means of covers or plugs, " and secure them with bolts, screws, clamps, or by bars or pauls, " or shores made of an eccentric form so as to jam in the " stoppings; I also make holes in the guns to let out the water, " and I stop these holes by an inside valve; I make these guns " with double trunnions and hollow casings, and I cast or forge " them so as to make them light, and so that the shrinkage may " take place as nearly equal as possible." "I also fit sighting " scuttles with an instrument for directing the lay of the gun, and " I make a corresponding instrument to be used on the gun, and " I have points on the gun to permit the instrument to be placed " in position so as to do away with the necessity of sighting " through the opening or port for the gun. In armouring and " protecting these vessels I fit ribs of a dovetail form, or with " rabbets to the edges so as to hold in the wood or other backing, " and I form the armour plates or other protecting material with " projections at the back so as to gain more resisting power with " the same weight, and also so that they can be held in place " with or without bolts. In some cases I cast these plates from " moulds to the form required; I cast them of any different " degrees of hardness, and anneal them as required. By making " these plates and backing of a diagonal form I am enabled to " reeve or sweep them into place, and the ribs in this case hold

"them in position; I fit these ribs over the whole structure, and "make them form part of it when desired by using them as "horizontal strips and butt strips so as to connect the plates of "the skin together, and I make the edges dovetailed or with a "rabbet, and I sweep or reeve in the wood backing, and cover "over the whole with plates of any degree of thickness, and fasten "them on with screws, nails, or bolts; these plates may be gal- "vanized, enamelled, or made of zinc or of any other suitable "metal. Sometimes I secure another skin over the wood "backing." "When I fit additional fastenings I prefer to pass "the bolts through hollow tubes, and I fill up with elastic or other "substance when the bolts are in place; also I make the bolts "with a continuous thread so that when hit the bolts will turn in "place. In the armouring of hatchways or openings for air or "other purposes I fit the 'coamings' to any desired height, and I "fit hinged covers below at such a distance as will allow to be "lifted up to admit of air; to the covers I place large water tables "to hold or turn off water or liquid fire, and to prevent the water "or liquid fire going below; I fit scuppers to these water tables "through the coamings, and I fit metal gratings over the top of "the covers so as to prevent shot or shell going below, and yet to "allow of free ventilation." "Further, I form covers for ports, "by preference with projections at the edges of the covers at top "and bottom, and secure them with strong lugs to the side, so "that the projections of the edges may with the lugs form the "hinge for the cover to work upon, or I work them with a large "rod or shaft through the side to turn them into and out of "position; this rod I fit with a balance weight to counterbalance "the weight of the port cover so as to move easily out of or into "position. The foregoing plans apply to any existing ship's "ports, batteries, and guns."

[Printed, 1*s*. Drawing.]

A.D. 1866, December 22.—N° 3373.

SLOPER, Joseph.—(*Provisional protection only.*) —" Improved "means of and apparatus for obtaining motive power, applicable "for driving machinery, and for ventilating mines, buildings, "ships, and other spaces." "I create or produce a powerful "current or currents of air by the means of one or more shafts "built in the usual way of brick or stone, or tubings of metal or "other material, that in proportion to the height or length of the "shafts, funnels, or tubings so the currents of air are increased,

"provided that the inside of the shafts, funnels, or tubings are of "the proper" proportions; "or I propose ascending funnels or "tubes made of any suitable material, and to connect and "continue from the lower part thereof, if desirable, a continuous "length of conduits or tubings in a longitudinal position along "the ground, or in any direction found most suitable, so as to "catch the air and create the most powerful current or currents "of air through the tubing and up the ascending shafts or "funnels."

"Having got my moving power I propose to affix or attach at "the upper part or outlets of the funnels or shafts my apparatus "or machinery, which consists chiefly of revolving fans, that is, "fans or vanes attached to a central drum, main shaft, or spindle "axle working on centres horizontally or otherwise; or my appa-"ratus may be placed within the shaft or funnel or in such a "position as by the current of air passing up or from the shaft "or funnel the current of air will cause the fans to revolve with "great velocity, and thus communicate a rotary motion to the "central main shaft, which motion is transmitted by means of "gearing to the machinery it is intended to actuate."

"I intend at the lower part or entrance of the tubing, where "the mouth or entrance is properly constructed, to fix or attach "another revolving fan of a similar kind as before described (if "necessary) working either horizontally or otherwise, for the "purpose of increasing the current of air through the tubings, "with other contrivances inside the tubings or funnels if neces-"sary for increasing the power, and also apparatus for regulating "the currents of air, or for the purpose of stopping the machinery "or setting it in motion; and I propose (if necessary) to add "upright or vertical apparatus, with revolving fans attached to a "central drum or shaft, and arranged or fixed in such a position "that the wind shall act freely on the fans, which fans will rotate, "and this power may be transmitted by means of toothed wheels "and other gear as an auxiliary power to the other machinery "acted on by the currents passing through the tubing or shafts."

[Printed, 4*d*. No Drawings.]

A.D. 1866, December 29.—N° 3421.

SIMONS, William, and BROWN, Andrew.—"Improvements "in the arrangement and construction of dredgers." The first part of this invention has for its essential object the combining together, so as to constitute one apparatus, that which has hitherto

existed as two separate and distinct appliances used for the dredging and conveying away of the material dredged, namely, the steam dredger proper, and the hopper barge.

In carrying out this part of the invention the hull of the dredger is built with a well to receive the ordinary bucket ladder in the usual manner, and the after or forward end of the hull is formed of larger capacity than usual, constituting, in fact, and forming the hopper cavity or space, into which the dredged material is discharged from the buckets, to the entire exclusion of the hopper barges or mud punts at present in use. As soon as the hopper is full the bucket ladder is raised into the well, the combined dredger and hopper is propelled or navigated by a screw or screws out to sea, or to any place where it is desired to deposit the dredgings, on arriving at which the doors at the bottom of the hopper are opened, and the contents or dredgings discharged, after which the doors are closed, and the vessel returns to carry on the dredging. By means of thus combining together into one vessel the dredger and hopper barge, the mud punts and hopper barges at present in use are dispensed with, whilst at the same time the crew ordinarily required for dredging operations is considerably diminished, and the expenses attendant thereon correspondingly reduced.

The second part of this invention relates to so constructing the dredger that it may be used in addition to the ordinary dredging operations, for the purpose of excavating or cutting land above or at the surface of the water, the sides of canals, rivers, embankments, and coasts. The ladder is so arranged that it may be elevated out of the water and raised to any required position, projecting over one end of the hull, so that the bucket may be brought to act upon the part above water requiring to be excavated or undercut. It is intended with this second modification of the invention to undercut the parts requiring removal, thus allowing the upper portion to break off or be detached through its own weight. When such portion has fallen in the water the bucket ladder is lowered to raise it in the ordinary manner. It is to be understood that this second part of the invention may be used in connection with the ordinary dredger hull, mud punts, or hopper barges, or with the combined dredger and hopper as herein-before described.

[Printed, 1*s*. 4*d*. Drawings.]

APPENDIX.

A.D. 1785, November 4.—N° 1504.

WATSON, CHRISTOPHER.—" New invented floating dock for " docking of ships in rivers, harbours, or at sea, and where there " is no tide." This floating dock was to be built of wood in the same manner as a ship, and the bottom was to be sheathed with deals. The midship section was to be that of a flat bottomed ship, planked inside and out. The after end was to be formed and built like the stern of a ship. The fore end was to be of the same shape and size as the midship section, and to be closed by a pair of gates, hinged at the sides, and placed at about half the breadth of the dock within the structure, measuring from the fore end of it. In these gates, scuttles were to be cut at different heights. The Specification appears to describe an actual dock, as built by the inventor, of the following dimensions, viz., length, 245 feet; breadth, 58 feet; depth on the blocks, 22 feet 9 inches; which the inventor says would dock 74, 90, and 100 gun ships. He says, further, " the utility of a floating dock is, to dock ships in " foreign parts where there is no flowing of tide by pumping out " the water to repair the bottoms of ships in a judicious way, to " prevent the great expence of heaving down, besides the risque " of springing their masts and straining the hulls to a consider- " able degree, and saving a great deal of time also. In many " part of this kingdom floating docks would be useful, and might " be sent from port to port in case of ships meeting with damage, " and could not be moved. Ships losing spring tides often in " other docks may undock at all times of tide, and any time in " the springs, by undocking in the deep water as soon as finished. " I try'd that experiment with the dock I invented to my great " satisfaction, as the ship was to load with gunpowder and shot " to relieve the garrison of Gibralter, which she did. N.B.—The " Mercury." The stern of the dock is shown to be fitted with a helm port, and platforms, for navigating her when necessary. She has three strakes of shoring ribbands at different heights within her, and a broad gunwale as a platform for workmen employed in docking.

[Printed, 1s. 2d. Drawing.]

A.D. 1790, March 24.—N° 1738.

RUMSEY, JAMES.—"New & improved certain methods of ap-"plying the power of water, of air, & of steam, either seperately "or together as circumstances may require, to the purposes of "milling & giving useful motion or effects to various kinds of "machines, & for the advantageous management of shipping, "and vessels of all descriptions used in & upon water of all "kinds, in various circumstances & situations." The invention consists, first, "in giving powerful motion to vessells, machines, "& engines by means of the reaction occasioned by projecting, "discharging, or forcing of water or other matter from them, by "the power of steam or other agents applied so as to exert their "force between the vessell or machine to be moved & a column "of water, or some other body that is independent of such vessell "or machine (as powder exerts itself between a cannon & the "independent ball), by which means the vessell or machine will "be impelled with a force proportionate to the power of the steam "(or agent employed instead thereof, & this vis inertiæ of the "water or other matter opposed thereto."

"Secondly, in giving motion to vessels, machines, or engines, "by putting water or other matter into motion by the force of "steam or other power and thereby causing it to vibrate in "tubes, or otherwise confined between the power of the agent "hat first produced the motion and some other power distinct "from and independent of the vessel or machine to be moved, in "such manner as to cause both the action and reaction of the "vibrating water or other body to propell the vessel or machine "in one and the same direction. This effect can only be pro-"duced by and between elastic body's, such as air, steam, "springs, &c., &c., between which, bating friction, a body once "put into motion would continue to vibrate with all the power "with which it first sat out."

"Thirdly, in giving powerful motion and other useful effects to "vessels, machines, or engines as well as to water or other matter "intended to be moved or otherwise managed, by causing water, "steam, or air to act either mediately or immediately, separately "or together, above, beneath, or against the weight, vis inertiæ, "or resistence of water or other matter intended to be raised or "moved in any direction whatever, or against pistons moving in "cylinders, tubes, or trunks, or against cylinders, tubes, or

" trunks moving within or between each other, or by themselves " or stationary pistons, or against wheels connected with move-" able boxes, tubes, trunks, cranks, carriages, weights, springs, " or poles, or against one or more of those varieties combined, so " as to produce useful motion or effects.

" Fourthly, in explaining and improving, and thereby making " useful, the mill or revolving tube first proposed by Doctor " Barker, by laying down the principles or action of the cen-" trifugal force impressed upon water revolving in a tube or " wheel, and also the causes that have hitherto prevented that " invention from coming into advantageous use, by which means " great advantages may be derived from a power that has " hitherto layed concealed, or been overlooked in the attempts " which have been made to bring that invention into practice."

Having laid down the general principles of his invention, the inventor proceeds to explain the distinct principle and form of each machine necessary for carrying these general principles into effect. Several of the machines or engines described are improvements on others of the same nature, invented by himself, for which he obtained Letters Patent on the 6th November 1788.

In addition to these machines, which do not relate to the subject of this series of Abridgments, the inventor describes a novel floating dock, as follows:—" My floating machine or dock for " building, repairing, or moving vessells in, is a large flat-bottomed " strait-sided scow vessell or machine, built strong & higher sided " than the draught of the water of the vessell intended to be put " into it. One end of this machine has strong gates that open " outwards, which, when opened, lets the machine sink deep " enough to slide it under a ship which passes thro' the aforesaid " gates." Both ends of the dock are of a semicircular form, so that the gates are also semicircular. " When the ship is in & " shoared up the gates are closed, & the water pumped out of the " machine or floating dock by my steam & forcing engine, or " otherwise, which will, as well as the sails of the ship, move this " floating dock in any direction, as over barrs, up or down shal-" low rivers, thro' canals, or into harbors or ports to load, whither " ships could not otherwise get. They are also excellent docks in " places where there is little or no flow of the tide; large ships, " loaded, may be moved in these machines with great facility " where there is but three or four feet of water."

[Printed, 1s. 4d. Drawing.]

A.D. 1859, January 1.—N° 14.

WIGZELL, MONTAGUE.—" An improved form of nail or driving " article." " The improvement is chiefly in the form which will " give strength and enable them to be made much lighter, and " cause the nail or other driving article to revolve whilst being " driven home, making it unnecessary for any hole to be pre- " viously made, and will cause it to offer a much greater resistance " than any other article of the kind. They are to be twisted or " made in a spiral or screw form, either fluted or plain, of any " shape, size, or thickness, either sharp or blunt, and to be made " whilst hot or cold in any kind of metal, by being rolled, cut, " stamped, cast, forged, pressed, turned, or by any other method " by which they can be produced."

The right is claimed of applying the invention or improvement to every description of driving nail, spike, holdfast, and every other kind of driving article, but in the Patent N° 2869 of 1861, granted to this patentee for improvements in machinery for manufacturing these fastenings, they are referred to as " twisted nails, " spiral fluted nails, bolts and screws for sheathing vessels, " ship-building, building, and other purposes."

[Printed, 8*d*. Drawing.]

A.D. 1859, October 21.—N° 2410.

BOUSFIELD, GEORGE TOMLINSON.—(*A communication from E. N. Dickerson.*)—" Improvements in apparatus for steering " vessels." The object of this invention is to subject the rudder of a ship to the power of an engine worked by steam or other fluid in such a manner that the rudder will obey the motion of the hand of the helmsman, moving when it moves, and stopping when it stops, without requiring any greater expenditure of power by the helmsman than is sufficient to operate the valves of the engines employed, however great may be the power required to work or hold the rudder.

It is proposed to employ the barrel of an ordinary fixed steering apparatus, to which the wheels in common use may be attached; there being a clutch of any convenient form, which may be unlocked at pleasure, leaving the ordinary steering wheel to be operated as is usual, by hand if so desired. There is a cog wheel, worked by a pinion fixed to a shaft, which is driven through a crank by the pistons of a pair of engines worked by

steam, air, "or other compressed fluid." These cylinders are placed at right angles to each other. The cog wheel should be connected to the barrel shaft by a friction clutch of any of the ordinary forms, which can be set to communicate any degree of power which they may have, from the engines to the rudder that may be required, and to stop when the resistance becomes greater than the machine is set for. The wheel which the helmsman works, may be placed anywhere in the ship most convenient for steering. A cog wheel connected with this hand wheel moves with it, and drives the valve shaft. There is an arm fixed to this valve shaft, to prevent the motion of the valve shaft further than a half revolution, which it does by striking stops firmly secured to the main shaft through the crank pin.

When it is desired to move the rudder the man moves the wheel, which rotates the valve shaft, the effect of which is to open one of the steam ports of one of the cylinders, and partially to close the lower steam port of the other cylinder. When the valves have moved thus far the engines will begin to move and will continue to move as long as the wheel is turned. When that wheel stops the engines will stop, a small part of the stroke then being made, and in whatever position their motion is arrested they will be ready to move in either direction in which the valve shaft is moved by the helmsman, as above described.

The inventor claims operating the rudder of a vessel by means of an engine, driven by steam or other fluid, having its valves so arranged and connected with a wheel or other moveable contrivance that the rudder will, by the power of such engine, be moved and stopped with the motion and rest of the hand of the helmsman as above described.

[Printed, 10*d.* Drawing.]

A.D. 1860, December 19.—N° 3121.

BROOMAN, Richard Archibald.—(*A communication from J. D. Duhousset, and P. E. Thomas.*)—"Improvements in the "treatment of caoutchouc and the employment of a product "obtained thereby for lubricating and coating bodies." This invention consists, first, in heating caoutchouc to a high temperature in a closed vessel, and thereby extracting from it or converting it into a viscous semi-fluid substance, which the inventors denominate "hévéone," and which is suitable for being employed,

either pure, or mixed with fatty or other matters, as a lubricator, or for coating metals, wood, and other substances.

Hévéone obtained according to any of the several methods is applied :—

"1. To increase the viscosity of all fatty bodies employed as "lubricators for machinery, fire-arms, and other apparatuses.

"2. To form waterproof coatings for preserving metals from "oxidation, wood, leather, and other like" materials, "from the "action of water or moisture, and so forth.

"3. To form luting for various apparatuses and a caulking "material for vessels and marine structures.

"When they employ hévéone as a grease or for lubricating the "inventors prefer to mix with it olive oil, in the proportion of "about 90 parts of the latter to 10 of the hévéone. When they "employ it as a coating they prefer to mix equal quantities of oil "and hévéone; but they do not limit themselves in either case to "those proportions, or to the use of any particular oil, grease, or "other substance. When it is to be applied to metals the hévéone "is made from pure (i. e. unvulcanized) caoutchouc, but when it "is to be applied to wood, leather, or other non-metallic sub- "stance, waste vulcanized caoutchouc may be employed."

[Printed, 4d. No Drawings.]

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INDEX OF SUBJECT MATTER.

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ERRATA IN PART I.

Since the publication of the first volume of the present series of Abridgments the following errata have been discovered therein :—

Page 6, line 9, *for* " Deighton " *read* " Deigton."

Page 44, line 38, *for* " Le Favre " *read* " Le Farre."

Page 152, line 31, *for* " January 7 " *read* " January 17."

Page 185, line 17, *for* " June 22 " *read* " July 22."

In Index of Subject Matter:

Page 618, *under* " Blocks, building, docking, &c." *insert*—

Bramwell, 503.

Scott, 173.

Page 620, *under* " Docks, slips, and gridirons " *insert*—

Bramwell, 503.

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